SOIL SURVEY OF

Valencia County, New Mexico, Eastern Part

United States Department of Agriculture
Soil Conservation Service
and
United States Department of the Interior
Bureau of Indian Affairs
In cooperation with
New Mexico Agricultural Experiment Station

Major fieldwork for this survey was done in the period 1960-69. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1969. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the East Valencia Soil and Water Conservation District and the Isleta Indian Reservation.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Valencia County, Eastern Part, are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the survey area in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the range site and the wildlife habitat group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Ranchers and others can find, under "Range Management," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the section "Use of the Soils for Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Valencia County, Eastern Part may be especially interested in the section "General Soil Map" where broad patterns of soils are described. They may also be interested in the information about the Area given in the section "General Nature of the Area."

Cover: **A young apple orchard in an area of nearly level, irrigated Gila loam near Los Lunas in the Rio Grande valley. The mountain in the background is El Cerro De Los Lunas.**

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SOIL SURVEY OF VALENCIA COUNTY, NEW MEXICO, EASTERN PART

BY DOUGLAS S. PEASE, SOIL CONSERVATION SERVICE

FIELDWORK BY DOUGLAS S. PEASE, CHARLES H. DIEBOLD, ARCHIE J. ROATH, AND ABE STEVENSON, SOIL CONSERVATION SERVICE[1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, AND UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS, IN COOPERATION WITH THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION

VALENCIA COUNTY, EASTERN PART, is in the west-central part of New Mexico (fig. 1). It is 545,620 acres in size, or about 853 square miles.

The survey area is bordered on the south by Socorro County, on the east by the Cibola National Forest and Torrance County, and on the north by Bernalillo County. The Manzano Mountains are to the east, and the Lucero uplift is to the west. In between is a physiographic trough called the Rio Grande graben. The Rio Grande and the Rio Puerco are incised valleys within the Rio Grande graben.

Los Lunas, the county seat of Valencia County, is on the Rio Grande in the north-central part of the survey area. Belen is about 11 miles south of Los Lunas. The population of the survey area is about 20,000.

About 39,000 acres in the Rio Grande valley are used for irrigated crops. Irrigation water comes from surface water diverted from the Rio Grande and supplemented by ground water from irrigation wells. About 115,000 acres is under the control of land developers for present and future community development. More than 90 percent of the survey area, including most of the land developments, is used for range.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are located, and how they can be used. The soil scientists went into the area knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil;

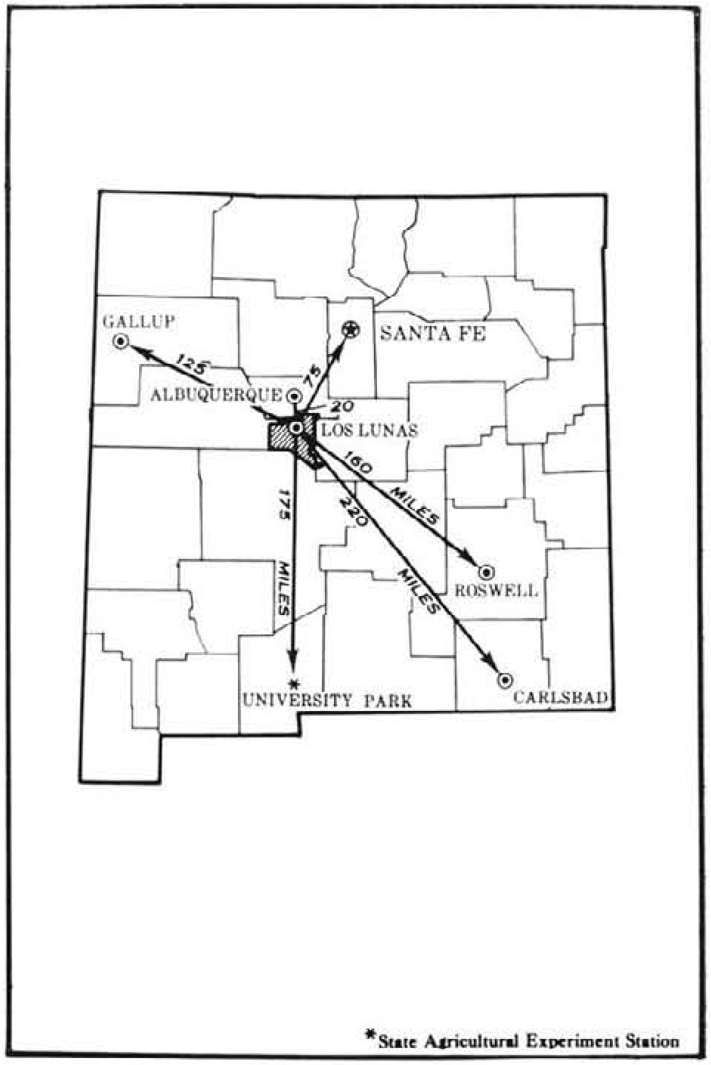

Figure 1.—Location of the Valencia County, Eastern Part, in New Mexico.

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[1] Part of the fieldwork was done by BASIL ARASKIN, CARLTON J. CARMICHAEL, DAVID L. CARTER, DELLON N. COX, TERRY P. DAVIS, HAYDEN D. ROUNSAVILLE, and ARLYN A. VINCENT, Soil Conservation Service; and by JOHN GLASS, WILLIAM KLOPSTECK, and HARRIS E. SAMPSON, Bureau of Indian Affairs.

it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Bluepoint and Caliza, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Bluepoint loamy fine sand, 1 to 3 percent slopes, is one of several phases within the Bluepoint series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of the survey area: soil complexes and soil associations.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and the relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Caliza-Bluepoint complex, 1 to 25 percent slopes, is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the sools may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Adelino-Tome association, gently sloping, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gullied land is a land type in this survey area.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

Soil Survey Intensities

Part of the survey area was mapped at low intensity, and part at high intensity. The high-intensity survey is more detailed than the low-intensity survey. The soils were examined at closer intervals, they are more homogeneous, and the mapping units contain fewer inclusions. The soil symbol is an indication of the survey intensity. The first letter of the symbol is a capital for all mapping units. The second is a small letter if the areas were mapped at high intensity, but a capital if the areas were mapped at low intensity. Soils mapped at both intensities are identified by two symbols.

The irrigated cropland in the Rio Grande valley and the adjacent land development areas east of the Rio Grande were mapped at high intensity. These areas make up about one-fourth of the survey area.

Ranching is the principal use of the soils of the East Valencia Area, and several of the ranches are large.

Most of these areas were mapped at low intensity. Soils, soil associations, and miscellaneous land types in the low-intensity survey make up about three-fourths of the survey area.

The "Guide to Mappping Units" at the back of this survey shows separately the soils, soil associations, and land types mapped at high intensity and those mapped at low intensity. Bluepoint sandy clay loam, 1 to 3 percent slopes, is an example of a soil mapped at high intensity. The Bluepoint-Adelino association, hummocky, is an example of low-intensity mapping unit. Bluepoint loamy fine said, 1 to 9 percent slopes, is an example of a soil mapped at both intensities. Small tracts mapped at low intensity are intermingled with soils mapped at high intensity. Examples of these are small tracts of Rock outcrop-Akela complex, 10 to 50 percent slopes, and areas of Gullied land.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey have been grouped into three general kinds of landscapes for broad interpretive purposes. Each of the broad groups and the soil associations in each group are described in the following pages. Unless otherwise stated, the terms for texture used in the title for several of the associations apply to the texture of the surface layer. For example, in the title of association 1, the word loamy refers to the texture of the surface layer.

The soil associations along the eastern boundary do not necessarily join similar associations in the adjacent Torrance Area soil survey. This difference is mainly due to variations in climate and relief, which are reflected in the kinds of soil in the two Areas.

Soils More Than 5 Feet to Bedrock: on the Rio Grande Flood Plain

Soil associations 1 and 2 are in the Rio Grande valley in the central part of the survey area. The soils formed in sandy to loamy recent alluvium. The native vegetation is alkali sacaton saltgrass, four-wing saltbush, cottonwood, Russian-olive, tamarisk, and willow trees. Elevations range from 4,750 to 4,950 feet.

1. Gila-Vinton-Agua association

Level, well-drained loamy soils

This association is in the Rio Grande valley. The soils formed in stratified alluvium. They are protected from overflow or flooding by levees along the river. The native vegetation consists mainly of alkali sacaton, saltgrass, and fourwing saltbush. Slopes are 0 to 1 percent.

Elevations range from about 4,750 feet to about 4,950 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 54° to 57° F. The frost-free season is 165 to 185 days.

This association makes up about 9 percent of the survey area. Gila soils make up about 45 percent of the association, Vinton soils 16 percent, and Agua soils about 14 percent. The remaining 25 percent consists of soils of the Bluepoint, Glendale, Armijo, Belen, Brazito, and Anapra series.

In this association Gila soils commonly occur as long, narrow tracts parallel to the river. They have a surface layer of brown loam overlying pink, pinkish-gray, very pale brown, and light-brown, stratified fine sandy loam, loamy fine sand, very fine sandy loam, silt loam, and loam.

The Vinton soils are commonly adjacent to the river or the valley slopes. They have a surface layer of brown loam and sandy clay loam overlying light-brown and light yellowish-brown loamy fine sand, fine sand, and loamy sand.

The Agua soils commonly occur as scattered tracts between Gila and Vinton soils. They have a surface layer of light-brown loam overlying brown, light-brown, and pink fine sandy loam, fine sand, and sand.

This association is used for irrigated crops and pasture, community development, wildlife habitat, and unimproved native pasture. The major irrigated crops are alfalfa hay, small grains, corn, sorghum, vegetables, orchards, and permanent pasture. Nearly all the irrigated cropland in the survey area is in this association. Much of the unimproved native pasture receives extra moisture from irrigation tail water or a seasonal water table.

Community development continually encroaches upon the irrigated cropland. Detailed onsite investigation is needed if engineering structures are planned because of the variability and complex pattern of the soils. The water table is at depths of about 4 to 15 feet. It is deep enough that it is not a problem for most uses. Contamination of the water supply is a hazard if the soils are used for septic tank filter fields or sanitary landfills. Kinds of wildlife are mainly scaled quail, mourning dove, and waterfowl.

2. Mixed alluvial land-Riverwash association

Nearly level, stratified clayey to sandy alluvium that has a fluctuating water table and is frequently reached by stream overflow

This association is in the Rio Grande river bottom between river levees. It formed in recent alluvium. The surface layer is of varying texture, and the underlying material is dominantly loamy sand and sand. The areas are subject to flooding. The Riverwash part of the association supports no vegetation. The vegetation on Mixed alluvial land part is cottonwood, Russian-olive tamarisk, willow trees, and an understory of saltgrass, alkali sacaton, and annual weeds. Slopes are 0 to 3 percent.

Elevations range from about 4,750 to about 4,950 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 54° to 57° F. The frost-free season is 165 to 185 days.

This association makes up about 1 percent of the survey area. Mixed alluvial land makes up about 65 percent of the association, and Riverwash makes up 15 percent. The remaining 20 percent consists of the present Rio Grande channel.

The Mixed alluvial land in this association consists of recent mixed alluvium of clays to sands, but the materials are dominantly sandy. Riverwash consists mainly of sand and gravel. These materials are stratified with fine to coarse sands and pockets of gravel.

The Mixed alluvial land part of this association has potential for development of recreational facilities, such as picnic areas, nature study areas, and wildlife refuges, especially for waterfowl. It is an area of natural greenery and has potential for beautification projects. Limitations for most other uses are severe because of the hazard of frequent and seasonal flooding. Mixed alluvial land has minor usefulness for grazing livestock and harvesting fireplace wood.

Soils More Than 5 Feet Deep to Bedrock; on Alluvial Fans, Mesas, and Terraces

Soil associations 3 through 12 are on alluvial fans, mesas, and terraces east and west of the Rio Grande. The soils formed in old, unconsolidated, mixed sandy and gravelly alluvium under a cover of shrub vegetation and short, mid, and tall grasses. Elevations range from 4,800 to 6,400 feet.

3. *Wink-Madurez association*

Well-drained, nearly level to moderately sloping soils that are loamy throughout, over layers high in lime; on mesas

Soils of this association formed in old, unconsolidated alluvium. The vegetation is mainly shrubs and short and mid grasses. Slopes are dominantly 1 to 9 percent.

Elevations range from 4,900 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up about 12 percent of the survey area. Wink soils make up 55 percent of the association, Madurez soils 20 percent, and Latene soils about 15 percent. The remaining 10 percent consists of soils of the Adelino, Armijo, and Pajarito series.

In this association Wink soils are on slightly convex mesas. They have a surface layer of brown fine sandy loam and a subsoil of light-brown sandy loam. Below the subsoil are substrata of light-brown and pinkish-white sandy loam that has a high content of lime.

The Madurez soils are slightly concave and gently sloping. They have a surface layer of light-brown fine sandy loam and a subsoil of brown light sandy clay loam. Below the subsoil are substrata of pink loam and sandy loam.

The soils of this association are used as range, watershed, and wildlife habitat. Several tracts have been subdivided into building lots for use in community development. Ranches in this association are large. The water supplies are limited. Water comes from wells and is distributed by pipelines. In places runoff water is channeled into farm ponds. Natural drainage of surface runoff is into small drainageways, the Rio Grande, and the Rio Puerco. Kinds of wildlife are mainly scaled quail, mourning dove, and antelope.

4. *Tres Hermanos-Madurez-Agustin association*

Well-drained, nearly level to moderately sloping soils that are loamy throughout; on piedmont uplands and alluvial fans

This association is on uplands east of the Rio Grande. The soils formed in distinguished granite alluvium and unconsolidated alluvium. The vegetation consists of short and mid grasses, forbs, and shrubs. Slopes are 1 to 9 percent.

Elevations range from 4,900 to 5,800 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up 10 percent of the survey area. Tres Hermanos soils make up about 50 percent of the association, Madurez soils 20 percent, and Agustin soils 15 percent. The remaining 15 percent of the association consists of soils of the Adelino, Wink, Latene, and Tome series.

Tres Hermanos soils are on the slightly convex upper parts of piedmont fans. They are gently sloping. Their surface layer is brown loam, and their subsoil is reddish-brown clay loam. They have substrata of pink very gravelly sandy loam and gravelly sandy loam that has a high content of lime.

In this association Madurez soils are on slightly concave lower parts of piedmont fans. They are gently sloping. Their surface layer is light-brown fine sandy loam, and their subsoil is brown sandy clay loam. They have substrata of pink loam and sandy loam that has a high content of lime.

Agustin soils are on low, convex ridges. These are sloping soils that have a surface layer of yellowish-brown fine sandy loam and a subsoil of brown sandy loam. Their substrata is pale-brown gravelly loam to gravelly sandy loam.

This association is used as range, wildlife habitat, and watershed. Several tracts have been subdivided into building lots for community development. Ranches are large, and water supplies are limited. Water comes from wells and is distributed through pipelines. Farm ponds are fed by runoff. Many arroyos and drainageways from the Manzano Mountains deposit sediment where they terminate on the fans occupied by the Tres Hermanos and Agustin soils of this association. Kinds of wildlife are mainly scaled quail, mourning dove, and antelope.

5. Tome-Adelino association

Well-drained, level and nearly level soils that are loamy throughout; on alluvial swales and fans

This association is in swales and on alluvial fans along drainageways west of the Manzano Mountains and in the southwestern corner of the survey area. The soils formed in mixed alluvium. The vegetation is mainly short grasses and forbs. Slopes are 0 to 3 percent.

Elevations range from 4,800 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up about 5 percent of the survey area. Tome soils make up about 60 percent of the association, and Adelino soils make up about 25 percent. The remaining 15 percent of the association consists of soils of the Arizo, Pajarito, Wink, and Agustin series.

In this association Tome soils are in concave swales. They are level to nearly level. Their surface layer is pale-brown very fine sandy loam. The next layer is light yellowish-brown loam to light clay loam and fine sandy loam. This is underlain by very pale brown and yellowish-red sandy loam and very fine sandy loam.

The Adelino soils are on slightly convex piedmont fans. They are nearly level. Their surface layer is brown and pale-brown fine sandy loam, and their subsoil is light-brown heavy loam. They have substrata of pale-brown and strong-brown loam, sandy clay loam, and sandy loam.

This association is used as range, watershed, and wildlife habitat. The range is used for cattle. Most ranches are large, and water supplies are limited. Water comes from scattered wells or from farm ponds fed by runoff. In most areas the range is in poor condition. The hazard of water erosion is moderate.

This association occupies low areas, and shallow flooding is common. The Tome soils, especially, receive runoff from surrounding slopes. Arroyos channel additional runoff onto most areas.

The soils of this association can be used for irrigated crops if irrigation water is available. They are a source of silty sediment. Kinds of wildlife are mainly scaled quail and mourning dove.

6. Tome-Adelino-Armijo association

Well-drained, level and nearly level saline and alkali soils that are loamy or clayey throughout; on terraces along the Rio Puerco

This association is on terraces along the Rio Puerco. The soils formed in mixed alluvium. The vegetation is sparse stands of annuals and short grasses. Slopes are 0 to 3 percent.

Elevations range from 4,800 to 5,200 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up about 2 percent of the survey area. Tome soils make up about 40 percent of the association, Adelino soils 30 percent, and Armijo soils 10 percent. The remaining 20 percent of the association consists of Gullied land and soils of the Bluepoint series.

In this association Tome soils consist of layers of pale-brown silty clay loam that is strongly saline and alkali. They are on terraces and are level to nearly level.

The Adelino soils in this association have a surface layer of pale-brown and brown fine sandy loam and a subsoil of light-brown heavy loam. The subsoil is underlain by substrata of pale-brown and strong-brown loam, sandy loam, and sandy clay loam. These soils are slightly saline and alkali. They are on the sides of terraces and are nearly level.

In this association the Armijo soils have a surface layer of pinkish-gray or brownish-gray clay and clay loam overlying light-brown and pinkish-gray clay, sandy clay, and clay loam. These soils are on level terraces. They are strongly saline and alkali.

The soils of this association are used as watershed, range, and wildlife habitat. The range is generally in poor condition. Most ranches are large, and water supplies are limited. Water comes from wells and farm ponds fed by runoff. Water is available in the Rio Puerco, but accessibility is difficult for livestock.

Runoff is rapid, and water erosion is a moderate to severe hazard. Erosion is a source of sedimentation in the Rio Puerco watershed. Kinds of wildlife are mainly scaled quail and mourning dove. Coyotes are common. Pottery shards, hearthsites, and other Indian artifacts can be found in this association.

7. Madurez-Wink association

Well-drained, gently undulating and undulating soils that have a sandy surface layer and loamy subsoil over layers high in lime; on alluvial fans

This association is on mesas east and west of the Rio Grande. The soils formed in old mixed alluvium and wind-worked materials. The vegetation is mid grasses and shrubs. Slopes are 1 to 5 percent.

Elevations range from 4,900 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is about 170 to 210 days.

This association makes up 19 percent of the survey area. Madurez soils make up about 70 percent of the association, and Wink soils make up 25 percent. The remaining 5 percent of the association consists of soils of the Pajarito, Bluepoint, and Latene series.

Madurez soils are on slightly convex piedmont fans. They are gently undulating. Their surface layer is light-brown loamy fine sand, and their subsoil is brown light sandy clay loam. They have substrata of pink, calcareous sandy loam and loam.

The Wink soils are on the sides of low ridges. They are gently undulating. Their surface layer is brown loamy sand, and their subsoil is light-brown sandy loam. They have substrata of light-brown and pinkish-white sandy loam that has a high content of lime.

The soils of this association are used for grazing, watershed, wildlife habitat, and community development. Most ranches are large, and water supplies are limited. Most drainageways are too small to be important. Water comes from wells and is distributed through pipelines. Farm ponds are fed by runoff. The hazard of soil blowing is severe.

Soil blowing is the most severe limitation if the soils are used for community development. Some tracts of the Wink soils have a very strongly alkaline, clayey substratum that presents moderate to severe limitations for use as filter fields for septic tanks. Kinds of wildlife are mainly scaled quail, mourning dove, and antelope.

8. *Bluepoint association*

Somewhat excessively drained, gently undulating to moderately sloping soils that are sandy throughout; on alluvial fans

This association is mainly on alluvial fans and valley filling sides along the Rio Grande and the Rio Puerco. The soils formed in sandy alluvium that has been modified by wind. The vegetation is principally shrubs and mid and tall grasses. Slopes are 1 to 9 percent.

Elevations range from 4,900 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up about 5 percent of the survey area. Bluepoint soils make up about 85 percent of the association. The remaining 15 percent of the association consists of soils of the Caliza, Pajarito, and Adelino series.

Bluepoint soils are on broad, convex alluvial fans. They have a surface layer of light-brown loamy fine sand overlying light-brown loamy sand and loamy fine sand.

The Caliza soils are on gravelly ridges on the upper parts of fans. The Pajarito and Adelino soils are on the lower parts of the fans.

The soils of this association are used as range, wildlife habitat, and watershed. Wells are the only source of water. Soil blowing is a hazard.

Small tracts have been subdivided into building lots for community development. The main problem in use of the soils of this association is the many arroyos that cut the soils and that are a source of sedimentation. Kinds of wildlife are mainly scaled quail and mourning dove.

9. *Bluepoint-Wink-Madurez association*

Well-drained to somewhat excessively drained, gently undulating to gently rolling soils that have a sandy surface layer over sandy to loamy layers; on wind-reworked alluvial fans

This association is on the piedmonts east and west of the Rio Grande. The soils formed in sandy and mixed alluvium and wind-worked sands. The vegetation is mid and tall grasses, forbs, and shrubs. Slopes are 1 to 9 percent.

Elevations range from 4,900 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up about 8 percent of the survey area. Bluepoint soils make up about 65 percent of the association. Wink soils 15 percent, and Madurez soils 15 percent. The remaining 5 percent of the association consists of soils of the Latene and Caliza series.

In this association Bluepoint soils are light-brown loamy fine sand and loamy sand throughout. Wink soils have a surface layer of brown loamy sand, a subsoil of light-brown sandy loam, and substrata of light-brown and pinkish-white sandy loam that has a high content of lime. Madurez soils have a surface layer of light-brown loamy fine sand, a subsoil of brown light sandy clay loam, and substrata of pink sandy loam and loam that has a high content of lime.

The soils of this association are used as range, community development, and wildlife habitat. A large area southeast of Belen has been subdivided into building lots for community development. Most ranches are large, and water supplies are limited. Water comes mainly from wells. Soil blowing is a severe hazard in areas of range that are in poor condition and in areas where the vegetation has been cleared to make way for subdivisions. Kinds of wildlife are mainly scaled quail and mourning dove.

10. *Caliza-Bluepoint association*

Well-drained to somewhat excessively drained, dominantly moderately sloping to hilly soils that are very gravelly to sandy throughout; on alluvial fans and terraces

This association occurs throughout the central and western parts of the survey area. The soils formed in sandy and gravelly alluvium and wind-worked sands. They range from very gravelly sandy loam to loamy sand in texture. The vegetation is short and mid grasses, forbs, and shrubs. Some scattered one-seed juniper trees grow in the western part of the area. Slopes are 1 to 25 percent.

Elevations range from about 4,900 to 5,700 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 165 to 210 days.

This association makes up about 12 percent of the survey area. Caliza soils make up about 45 percent of the association, and Bluepoint soils make up about 40 percent. The remaining 15 percent of the association consists of soils of the Madurez, Wink, Pajarito, and Farb series.

The Caliza soils are on ridges. They are gently rolling to hilly. Their surface layer is very pale brown very gravelly sandy loam. This is underlain by light-gray very gravelly loamy sand that has a high content of lime.

In this association Bluepoint soils are on sandy alluvial fans. They are gently undulating to gently rolling. Their surface layer is light-brown loamy fine sand. This is underlain by light-brown loamy sand or loamy fine sand and gravel. Gravel makes up 5 to 20 percent of the underlying material.

This association is used mainly as range, wildlife habitat, and watershed. Local areas are a potential source of sand and gravel. Ranches are small to large, and water supplies are limited. Water comes mainly from wells. The hazard of water erosion is moderate to severe, and sedimentation is a common problem. Local tracts are a source of Indian artifacts. Kinds of wildlife are mainly scaled quail and mourning dove.

11. *Nickel-Latene-Ildefonso association*

Well-drained, nearly level to hilly soils that are very gravelly to loamy throughout; on alluvial fans

This association is on dissected alluvial fans in the western foothills of the Manzano Mountains. The soils formed in old limy, gravelly alluvium. The vegetation consists of short and mid grasses, shrubs, and one-seed juniper. Slopes are 1 to 25 percent.

Elevations range from 5,400 to 6,400 feet. The average annual precipitation is 7 to 14 inches, and the average annual air temperature is 50° to 60° F. The frost-free season is 145 to 210 days.

This association makes up about 5 percent of the survey area. Nickel soils make up about 30 percent of the association, Latene soils 25 percent, and Ildefonso soils 25 percent. The remaining 20 percent consists of soils of the Deama, Laporte, Dean, Pinon, and Sedillo soils.

Nickel soils are on edges and sides of ridges and breaks. They are gently rolling to hilly. Their surface layer is pale-brown gravelly fine sandy loam. This overlies pale-brown and white gravelly loam, very gravelly loam, and very gravelly sandy loam.

Latene soils are on the upper parts of old alluvial fans. They are nearly level to strongly sloping. Their surface layer is light-brown loam. This overlies pink gravelly loam and gravelly sandy loam that has a high content of lime.

Ildefonso soils are on alluvial fans on foot slopes of the Manzano Mountains. They are rolling to hilly. Their surface layer is grayish-brown stony sandy loam. This overlies light brownish-gray and white very gravelly sandy loam, light-gray very cobbly sandy loam, and pale-brown gravelly sandy loam.

This association is used as range, wildlife habitat, and watershed. The Nickel and Ildefonso soils are a potential source of gravel. Ranches are large, and water supplies are limited. Water comes mainly from wells and is distributed through pipelines. The hazard of water erosion is moderate to severe. Kinds of wildlife are mainly scaled quail and mourning dove on the Nickel and Latene soils. Deer find habitat on the Ildefonso soils.

12. Sedillo association

Well-drained, gently sloping to moderately sloping soils that are very gravelly throughout; on alluvial fans

This association is on alluvial fans in the foothills of the Manzano Mountains. The soils formed in mixed gravelly alluvium. The vegetation is mainly short and mid grasses, shrubs, and one-seed juniper. Slopes are 3 to 9 percent.

Elevations range from 5,600 to 6,400 feet. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 50° to 53° F. The frost-free season is 145 to 170 days.

This association makes up about 5 percent of the survey area. Sedillo soils make up about 90 percent of the association. The remaining 10 percent of the association consists of soils of the Ildefonso, Tres Hermanos, Millett, and Tesajo soils.

Sedillo soils are on alluvial fans and piedmonts at the foot of the Manzano Mountains. Their surface layer is brown very gravelly loam, and their subsoil is brown and reddish-brown very gravelly clay loam and very gravelly sandy clay loam. They have substrata of pinkish-gray and brown very gravelly sandy loam that has a high content of lime.

The Ildefonso soils are on the upper parts of fans. They are rolling and hilly. The Tres Hermanos soils are on the lower edges of the fans and piedmonts. The Millett and Tesajo soils are on fans; the soils contain fine granitic gravel.

This association is used as range, wildlife habitat, and watershed. Ranches are large, and water supplies are limited. Water comes from developed springs and wells and is distributed through pipelines. The hazard of water erosion is moderate. Some areas of this association are sources of gravel or stones that are suitable for use in road construction and as riprap for earthen structures. Deer is the main kind of wildlife.

Soils Less Than 5 Feet Deep to Bedrock; on Mountains and Foothills, Basalt Flows, Badland, or Rock Outcrops

Soil associations 13 through 15 are mainly on mountains and basalt lava flows in the eastern, western, and central parts of the survey area. The soils formed in material weathered from metamorphic and granitic rocks and from basalt bedrock. The vegetation is mid grasses, shrubs, one-seed juniper, and pinyon pine. Elevations range from 4,800 to 8,000 feet.

13. Salas-Santa Fe association

Dominantly steep and very steep, moderately deep, well-drained very gravelly soils; on mountains and foothills

This association is in the Manzano Mountains. The soils formed in material weathered mainly from schist and granite. The vegetation consists of mid grasses, shrubs, one-seed juniper, and pinyon pine. Slopes are 25 to 70 percent.

Elevations range from about 6,000 to 8,000 feet. The average annual precipitation is about 10 inches at the lower elevations and as much as 14 inches at the highest elevations. The average annual air temperature is about 53° F. at the lowest elevations and about 50° at the highest elevations. The frost-free season is 145 to 170 days.

This association makes up about 1 percent of the survey area. Salas soils make up about 45 percent of the association, and Santa Fe soils about 20 percent. The remaining 35 percent of the association consists of stony soils, escarpments, and the land type Rock outcrop and Landslides.

Salas soils are on mountains where the rocks are metamorphic. These soils are steep to very steep. Their surface layer is brown very stony loam, and their subsoil is reddish-brown, brown, and very pale brown very gravelly clay loam and very gravelly loam. The subsoil overlies schist bedrock at depths of about 39 inches.

Santa Fe soils are on mountains where the rocks are granitic. These soils are moderately steep to very steep. Their surface layer is dark-brown very stony loam, and their subsoil is brown and strong-brown very gravelly clay loam. The subsoil overlies granite bedrock at depths of about 24 inches.

This association is used mainly as watershed, range, and wildlife habitat. Restrictions for most other uses are severe because of the slope and the rock outcrops. Most of the drainage is concentrated in canyons and arroyos that terminate in alluvial fans at lower lying positions. Most areas that are suitable for grazing cattle are on the lower part of the slopes. Deer is the main kind of wildlife.

14. Rock outcrop-Akela-Alemeda association

Nearly level to very steep rock outcrop and very shallow to moderately deep, well-drained very gravelly soils; on basalt lava flows

This association is generally west of the Rio Grande. The Rock outcrop part consists of basalt extrusions, lava flows, plugs, cinder cones, and basalt rubble along the edges of flows. The Akela and Alemeda soils formed in material weathered from basalt flows and basalt bedrock. They are shallow to moderately deep. The vegetation is mid grasses, shrubs, and annuals. Slopes are 1 to 50 percent.

Elevations range from about 4,900 to 6,000 feet. The average annual precipitation is 7 to 10 inches, and the average annual air temperature is 57° to 60° F. The frost-free season is 170 to 210 days.

This association makes up 2 percent of the survey area. Rock outcrop makes up about 45 percent of the association, Akela soils about 35 percent, and Alemeda soils about 15 percent. The remaining 5 percent of the association consists of minor soils.

The Akela soils have a surface layer of brown gravelly sandy loam overlying very pale brown very gravelly sandy loam. Basalt bedrock begins at a depth of 10 to 20 inches.

The Alemeda soils have a surface layer of light-brown loamy fine sand and brown fine sandy loam. Their subsoil is brown sandy clay loam and light-brown gravelly loam. They have substrata of pink very cobbly loam. Basalt bedrock begins at a depth of 20 to 40 inches.

This association is used as native range, watershed, and wildlife habitat. Limitations are severe for most engineering uses because the soils are steep and are shallow to bedrock, basalt cobblestones, and stones. Local areas are a source of basalt stone, rock, or cinders. Kinds of wildlife are mainly scaled quail and mourning dove.

15. Badland-Rock outcrop and Landslides association

Steep to very steep dissected land types

The land types in this association are of highly variable, soft geologic material or hard rock outcrops. They occupy areas throughout the survey area, generally parallel to the Rio Grande and the Rio Puerco. The association occurs as high mesa breaks along the western edge of the Manzano Mountains and on the eastern and western edges of the mesa west of the Rio Grande. It also occurs as very steep, deeply dissected areas broken by many intermittent drainage channels that form narrow, V-shaped valleys and sharp, tortuous divides. The vegetation is sparse. Slopes are 25 to more than 100 percent.

Runoff is rapid, and geologic erosion is active. Erosion has exposed the soft, highly stratified rock of the Santa Fe Formation. In areas where the finer textured geologic material predominates, ridges are sharp and slopes are very steep. In areas where coarse-textured gravelly or rocky materials predominate, the ridges are wider and less sloping.

Elevations range from about 4,800 to 6,000 feet. The average annual precipitation is about 9 to 12 inches, and the average annual air temperature is 50° to 60° F. The frost-free season is 145 to 210 days.

This association makes up 4 percent of the survey area. It is used as watershed and wildlife habitat. Restrictions are severe for nearly all uses because of the slope and the nature of the materials. Some local areas are a source of sand and gravel, but accessibility is a problem. The land types in this association are a source of sedimentation in the Rio Puerco and Rio Grande watersheds.

Descriptions of the Soils

This section describes the soil series and mapping units in the survey area. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or there are differences that are apparent in the name of the mapping unit. Color terms are for dry soil unless otherwise stated. Reaction (pH) terms used in soil descriptions are made with field indicators and are based on a dilution of about 1 : 5.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Badland and Gullied land, for example, do not belong to a soil series, but nevertheless, are listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit or capability subclass, range site, and wildlife habitat group in which the mapping unit has been placed. The page for the description of each capability unit, range site, and wildlife habitat group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*10*).[2]

Descriptions, names, and delineations of soils in this soil survey do not fully agree with soil maps in adjacent counties published at a different date. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, and the extent of soils within the survey. In some places it is more feasible to combine small acreages of similar soils that respond to use and management in much the same way than it is to separate these soils and give them names.

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[2] Italic numbers in parentheses refer to Literature Cited, p. 119.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres		Percent
	High intensity	Low intensity	
Adelino fine sandy loam	2, 126	--------	0. 4
Adelino-Tome association, gently sloping	--------	8, 443	1. 5
Agua clay loam	873	--------	. 2
Agua loam	1, 973	--------	. 4
Agua loam, moderately alkali	350	--------	. 1
Agua loam, slightly saline	906	--------	. 2
Agustin fine sandy loam	1, 635	--------	. 3
Agustin-Adelino association, gently sloping	--------	11, 275	2. 1
Akela-Rock outcrop complex, 1 to 9 percent slopes	--------	5, 148	. 9
Alemeda loamy fine sand, 0 to 5 percent slopes	--------	1, 667	. 3
Anapra clay loam	370	--------	. 1
Armijo clay, slightly saline	302	--------	. 1
Armijo clay	1, 019	--------	. 2
Armijo loam, moderately alkali	377	--------	. 1
Armijo sandy clay loam, nonsaline	--------	1, 061	. 2
Badland	--------	14, 417	2. 6
Belen clay loam	508	--------	. 1
Belen clay loam, moderately alkali	360	--------	. 1
Belen loam	216	--------	(1)
Bluepoint fine sand, rolling	--------	862	. 2
Bluepoint loamy fine sand, 1 to 3 percent slopes	3, 885	--------	. 7
Bluepoint loamy fine sand, 1 to 9 percent slopes	1, 650	25, 808	5. 0
Bluepoint loamy fine sand, hummocky	--------	20, 969	3. 8
Bluepoint loamy sand, hilly	--------	9, 247	1. 7
Bluepoint sandy clay loam, 1 to 3 percent slopes	748	--------	. 1
Bluepoint-Adelino association, hummocky	--------	5, 193	. 9
Bluepoint-Wink complex, hummocky	6, 518	--------	1. 2
Brazito loamy fine sand	186	--------	(1)
Brazito soils, moderately alkali	410	--------	. 1
Brazito sandy clay loam, thick surface	2, 040	--------	. 4
Brazito sandy clay loam, thick surface, moderately saline	429	--------	. 1
Caliza-Bluepoint complex, 1 to 25 percent slopes	2, 145	34, 863	6. 8
Deama-Laporte association, steep	--------	849	. 2
Dean-Pinon association, gently sloping	--------	1, 073	. 2
Farb-Rock outcrop complex, 5 to 25 percent slopes	--------	1, 644	. 3
Gila clay loam	5, 225	--------	1. 0
Gila clay loam, slightly saline	785	--------	. 1
Gila clay loam, moderately alkali	456	--------	. 1
Gila loam	9, 090	--------	1. 7
Gila loam, slightly saline	1, 289	--------	. 2
Gila loam, strongly alkali	1, 129	--------	. 2
Gila loam, strongly saline and alkali	2, 021	--------	. 4
Gila loam, moderately alkali	1, 037	--------	. 2
Gila loamy fine sand	591	--------	. 1
Gila loamy fine sand, strongly alkali	349	--------	. 1
Glendale clay loam	1, 633	--------	. 3
Glendale loam	912	--------	. 2
Glendale loam, strongly alkali	246	--------	(1)
Glendale soils, slightly saline	627	--------	. 1
Gullied land	--------	2, 518	. 5
Hassell loam, 2 to 5 percent slopes	--------	170	(1)
Ildefonso stony sandy loam, 10 to 20 percent slopes	--------	4, 599	. 8
Largo loam	145	173	. 1
Largo silty clay loam	170	--------	(1)
Latene loam	--------	13, 095	2. 4
Latene loamy fine sand	--------	5, 024	. 9
Madurez fine sandy loam	2, 356	--------	. 4
Madurez loamy fine sand	10, 998	31, 516	7. 8
Madurez loamy sand, hummocky	2, 067	--------	. 4
Madurez-Bluepoint association, hummocky	--------	9, 969	. 7 1. 8
Madurez-Wink association, undulating	--------	38, 134	7. 0
Millett-Tesajo association, sloping	--------	3, 051	. 5
Mixed alluvial land	3, 819	--------	. 7
Nickel-Latene association, rolling	--------	10, 910	2. 0
Pajarito fine sandy loam	--------	2, 981	. 5
Pajarito loamy fine sand	2, 679	--------	. 5
Pajarito loamy fine sand, hummocky	323	--------	. 1
Riverwash	723	--------	. 1
Rock land	--------	4, 533	. 8
Rock outcrop-Akela complex, 10 to 50 percent slopes	--------	5, 315	1. 0
Rock outcrop and Landslides	--------	3, 168	. 6
Salas very stony loam, 30 to 70 percent slopes	--------	5, 188	. 9
Santa Fe very stony loam, 25 to 70 percent slopes	--------	1, 607	. 3
Sedillo very gravelly loam, 3 to 9 percent slopes	--------	15, 260	2. 8
Sedillo very stony loam, 3 to 9 percent slopes	--------	8, 606	1. 6
Tome very fine sandy loam	--------	7, 380	1. 4
Tome-Adelino association, slightly saline and alkali	--------	7, 838	1. 4
Tome-Arizo complex	--------	6, 959	1. 3
Tome-Armijo association, strongly saline and alkali	--------	9, 743	1. 8
Tres Hermanos fine sandy loam	745	--------	. 1
Tres Hermanos-Madurez association, gently sloping	--------	40, 742	7. 5
Vinton clay loam	462	--------	. 1
Vinton loam	3, 345	--------	. 6
Vinton loam, moderately saline and alkali	471	--------	. 1
Vinton loamy fine sand	491	--------	. 1
Vinton loamy fine sand, slightly saline	357	--------	. 1
Vinton loamy fine sand, moderately alkali	385	--------	. 1
Vinton loam, slightly saline	968	--------	. 2
Vinton loamy fine sand, loamy subsoil variant	236	--------	(1)
Vinton loam, loamy subsoil variant	874	--------	. 2
Vinton clay loam, loamy subsoil variant	218	--------	(1)
Wink fine sandy loam	--------	11, 951	2. 2
Wink loamy sand	11, 288	--------	2. 0
Wink loamy sand, hummocky	6, 399	--------	1. 1
Wink loamy sand, clayey substratum	1, 267	--------	. 2
Wink-Caliza complex, 1 to 15 percent slopes	991	--------	. 2
Wink-Madurez association, gently sloping	--------	43, 897	8. 0
Wink complex, 1 to 9 percent slopes, eroded	869	--------	. 2
Gravel and caliche pits	148	--------	(1)
Made land	19	--------	(1)
Mill waste	26	--------	(1)
Rio Grande channel	1, 469	--------	. 3
Water	30	--------	(1)
Total	108, 754	436, 866	100. 0

See footnote at end of table.

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[1] Less than 0.05 percent.

Adelino Series

The Adelino series consists of well-drained soils on piedmont fans. These soils formed in mixed old alluvium. The vegetation is dominantly short and mid grasses and half-shrubs. Slopes are 0 to 5 percent. Soils of the Adelino series are associated with soils of the Agustin and Tome series.

Elevations range from 5,000 to 5,700 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown and pale-brown fine sandy loam about 4 inches thick. The subsoil is light-brown, calcareous heavy loam about 11 inches thick. The upper part of the substratum is pale-brown, calcareous loam or sandy clay loam. Strong-brown sandy loam is below a depth of about 38 inches.

Permeability is moderate. The available water capacity is 8 to 9.5 inches. The effective rooting depth is 60 inches or more.

Adelino soils are used as range, watershed, and wildlife habitat. A few small tracts have been subdivided into building lots.

Representative profile of Adelino fine sandy loam, about 5 miles east of Tome; 0.5 mile east and 1 mile north of windmill:

A11—0 to 2 inches, brown (10YR 5/3, 10YR 4/3 moist) fine sandy loam; single grained; loose when dry or moist, nonsticky and nonplastic; many fine roots; common fine interstitial pores; noncalcareous, moderately alkaline (pH 8.0); abrupt boundary. 0 to 4 inches thick.

A12—2 to 4 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak, thick, platy structure; soft, very friable, nonsticky and nonplastic; many fine roots; few fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); abrupt boundary. 2 to 8 inches thick.

B21—4 to 11 inches, light-brown (7.5YR 6/4) heavy loam, brown (7.5YR 4/4) moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 6 to 12 inches thick.

B22—11 to 15 inches, light-brown (7.5YR 6/4) heavy loam, brown (7.5YR 4/4) moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; few medium, distinct, white (N 8/0) lime masses; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 4 to 11 inches thick.

C1ca—15 to 30 inches, pale-brown (10YR 6/3) heavy loam, yellowish brown (10YR 5/4) moist; weak, medium, subangular blocky structure; very hard, friable, sticky and plastic; many very fine roots; common very fine tubular pores; common medium, distinct, white (N 8/0) lime masses; strongly calcareous, strongly alkaline (pH 8.5); clear boundary. 7 to 19 inches thick.

C2—30 to 38 inches, pale-brown (10YR 6/3) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; few medium, distinct, white (N 8/0) lime masses; moderately calcareous, strongly alkaline (pH 8.5); clear boundary. 6 to 22 inches thick.

IIC3—38 to 60 inches, strong-brown (7.5YR 5/6, 7.5YR 4/6 moist) sandy loam; massive; slightly hard, very friable, nonsticky and nonplastic; no roots; common very fine tubular pores; slightly calcareous, moderately alkaline (pH 8.2).

The A horizon is light-brown, pale-brown, or brown loam, fine sandy loam, or loamy sand. The B2 horizon is light-brown, pale-brown, or brown heavy loam, sandy clay loam, or light clay loam that is 22 to 35 percent clay. The C1ca horizon is pink, light-brown, pale brown, or very pale brown loam, sandy clay loam, or light clay loam that is 22 to 32 percent clay. It ranges from weak, medium, subangular blocky structure to massive. The content of lime ranges from common masses to many threads that have a calcium carbonate equivalent of about 8 to 14 percent. The C2 horizon is pink, light-brown, pale brown, or very pale brown loam or sandy clay loam that is 22 to 32 percent clay. The lime in this horizon ranges from disseminated particles to a few masses and threads. The IIC3 horizon is discontinuous. Some profiles have limy horizons or other contrasting horizons below a depth of 40 inches.

Adelino fine sandy loam (0 to 3 percent slopes) (Ad).—This level to nearly level soil is on piedmont fans east of the Rio Grande. It has the profile described as representative of the Adelino series. The soil was surveyed at high intensity.

Included with this soil in mapping are areas of Tome, Agustin, and Wink soils.

Runoff is medium. The hazard of soil blowing is moderate.

This Adelino soil is used as range, watershed, and wildlife habitat. A few small tracts have been subdivided into building lots. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Adelino-Tome association, gently sloping (AE).—This association is in the southwestern part of the survey area. It is about 50 percent Adelino fine sandy loam and 40 percent Tome loam. The soils were surveyed at low intensity.

The gently sloping Adelino soil is on slightly convex piedmont fans. It has a profile similar to the one described as representative of the series, but the surface layer is light-brown loam or fine sandy loam about 10 inches thick. Runoff is medium. The hazard of soil blowing is moderate.

The nearly level Tome soil is in concave swales. It has a profile similar to the one described as representative of the series, but the surface layer is grayish-brown to brown silt loam or loam about 7 inches thick. Runoff is medium, and the erosion hazard is moderate.

Included in the areas mapped are areas of Wink soils. These areas make up about 10 percent of the acreage.

This association is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Agua Series

The Agua series consists of well-drained soils on the Rio Grande flood plain. These soils formed in recent alluvium. The native vegetation is principally alkali sacaton, saltgrass, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Agua series are associated with soils of the Gila and Brazito series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is light-brown loam about 10 inches thick. The next layer is brown to light-brown fine sandy loam about 20 inches thick. Below this is pink fine sand grading to sand that extends to a depth of 60 inches or more.

Permeability is moderate to a depth of 30 inches and rapid in the substratum. The available water capacity is 5.5 to 7 inches. The effective rooting depth is 20 to 38 inches, but a few alfalfa roots penetrate into the substratum.

Agua soils are used for irrigated hay, small grains, row crops, pasture, community development, and wildlife habitat.

Representative profile of Agua loam, about 1.1 miles west of Bosque Farms; 750 feet west of Otero Lateral, and 750 feet south of Isleta Indian Reservation:

Ap—0 to 10 inches, light-brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak, fine, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 6 to 11 inches thick.

C1—10 to 22 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) fine sandy loam; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine tubular pores; few, fine, distinct iron mottles; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 7 to 13 inches thick.

C2—22 to 30 inches, light-brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine tubular pores; common, very fine, distinct iron mottles; slightly calcareous, moderately alkaline (pH 8.4); abrupt boundary. 7 to 14 inches thick.

IIC3—30 to 48 inches, pink (7.5YR 7/4) fine sand, light brown (7.5YR 6/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; many very fine interstitial pores; noncalcareous, moderately alkaline (pH 8.0); gradual boundary. 0 to 23 inches thick.

IIC4—48 to 60 inches, pink (7.5YR 7/4) sand, light brown (7.5YR 6/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; many fine interstitial pores; many organic stains and iron stains on sand grains; noncalcareous, moderately alkaline (pH 8.0).

The A horizon is brown, light brown, pale brown, or light brownish gray. The texture of the A horizon is loam, fine sandy loam, sandy clay loam, or clay loam. The C horizon is brown, light brown, pale brown, or very pale brown. This horizon is loam, very fine sandy loam, or fine sandy loam and is less than 18 percent clay. Thin strata of silt loam commonly occur at a depth of 10 to 30 inches. The IIC horizon is light brown, pale brown, light yellowish brown, very pale brown, or pink. The texture of this horizon is fine sand to coarse sand. Fine gravel makes up 0 to 15 percent of the IIC horizon.

Agua clay loam (0 to 1 percent slopes) (Am).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is light brownish-gray clay loam about 9 inches thick.

Included with this soil in mapping are areas of Gila soils; Brazito sandy clay loam, thick surface; and Agua loam, moderately alkali.

Runoff is slow, and the hazard of erosion is slight.

This Agua soil is primarily used for irrigated alfalfa, small grains, row crops, pasture, and wildlife habitat. Small tracts are also used for community development and unimproved pasture. Capability unit IIs–5, irrigated; wildlife habitat group C.

Agua loam (0 to 1 percent slopes) (Ag).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Gila and Agua soils, and Brazito sandy clay loam, thick surface.

Runoff is very slow, and the hazard of erosion is slight.

This Agua soil is used for irrigated alfalfa, small grains, row crops, pasture, wildlife habitat, and community development. Small tracts are also used for unimproved native pasture. Capability unit IIs–1, irrigated; wildlife habitat group C.

Agua loam, moderately alkali (0 to 1 percent slopes) (Ak).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, except that in about 35 percent of the acreage the surface layer is strongly to very strongly alkaline and is more than 15 percent exchangeable sodium. The soil material is dispersed; it crusts easily and takes in water slowly. In about half the acreage, the soil also contains more than 0.18 percent soluble salts. The water table is at a depth of 40 inches. The available water capacity is 4 to 5 inches.

Included with the areas mapped are areas of Gila soils, Brazito soils, and strongly alkali Agua soils. These areas make up about 15 percent of the acreage.

Runoff is slow, and the hazard of erosion is slight.

This Agua soil is used for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. Many tracts are idle. Capability unit IIIs–5, irrigated; wildlife habitat group C.

Agua loam, slightly saline (0 to 1 percent slopes) (Ah).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but it has more than 0.18 percent soluble salts, and the water table is at depths below 40 inches. White crusts of salts are common on the surface. Several tracts on the Isleta Indian Reservation have a surface layer of sandy clay loam. The available water capacity is 4 to 5 inches.

Included with this soil in mapping are areas of Gila and Brazito soils.

Runoff is slow, and the hazard of erosion is slight.

This Agua soil is used primarily for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. Capability unit IIIs–4, irrigated; wildlife habitat group C.

Agustin Series

The Agustin series consists of well-drained soils formed in old granitic alluvium on piedmont fans. The vegetation is principally short and mid grasses and cactus. Slopes are 0 to 9 percent. Soils of the Agustin series are associated with soils of the Adelino and Tres Hermanos series.

Elevations range from 5,000 to 5,800 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is yellowish-brown fine sandy loam about 3 inches thick. The subsoil is brown, calcareous sandy loam about 10 inches thick. The substratum is pale-brown, calcareous gravelly loam to gravelly sandy loam. It contains strata of loam or fine sandy loam.

Permeability is moderately rapid. The available water capacity is 6.5 to 7.5 inches. The effective rooting depth is 60 inches or more.

Agustin soils are used as range, watershed, and wildlife habitat.

Representative profile of Agustin fine sandy loam, about 6 miles east of Tome; 1.75 miles east and 0.95 mile north of windmill:

A1—0 to 3 inches, yellowish-brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; few fine tubular pores and common very fine interstitial pores; 5 percent fine gravel; noncalcareous, moderately alkaline (pH 8.0); abrupt boundary. 2 to 6 inches thick.

B2—3 to 13 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) heavy sandy loam; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common very fine tubular pores; 5 percent fine gravel; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 9 to 17 inches thick.

C1ca—13 to 21 inches, pale-brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores; 15 percent fine gravel; common, medium, distinct masses of white (10YR 8/2) lime, very pale brown (10YR 7/3) moist; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 6 to 15 inches thick.

C2—21 to 29 inches, pale-brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few very fine tubular pores and common fine interstitial pores; 30 percent fine gravel; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 6 to 25 inches thick.

C3—29 to 35 inches, pale-brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 10 percent fine gravel; moderately calcareous, moderately alkaline (pH 8.4); abrupt boundary. 0 to 8 inches thick.

C4—35 to 51 inches, pale-brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; no roots; common fine interstitial pores; 30 percent gravel; moderately calcareous, moderately alkaline (pH 8.4); abrupt boundary. 12 to 24 inches thick.

C5—51 to 60 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; no roots; few very fine tubular pores and common very fine interstitial pores; 5 percent fine gravel; moderately calcareous, moderately alkaline (pH 8.3).

The A horizon is brown or yellowish brown in color and ranges from fine sandy loam to gravelly sandy loam. Gravel makes up 5 to 30 percent of the horizon. The B horizon is brown in hues of 7.5YR and 10YR, and its texture ranges from sandy loam to gravelly loam. Clay makes up 15 to 20 percent of the B horizon, and gravel makes up 5 to 30 percent. The structure is weak and moderate, medium, subangular blocky. The C horizon is pale brown or light brown in color and ranges from gravelly loam to gravelly sandy loam in texture. It is 15 to 35 percent gravel. Thin, discontinuous horizons of loam, sandy clay loam, and fine sandy loam are common. The lime in the upper part of the C horizon ranges from few to common threads and masses; in the lower part of the C horizon it ranges from disseminated particles to few threads and masses.

Agustin fine sandy loam (1 to 3 percent slopes) (An).—This nearly level soil is on the piedmont east of the Rio Grande. It has the profile described as representative of the Agustin series.

Included with this soil in mapping are areas of Tres Hermanos, Adelino, and Pajarito soils.

Runoff is medium, and the hazard of soil blowing is moderate.

This Agustin soil is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Agustin-Adelino association, gently sloping (AO).—This association consists of about 50 percent Agustin fine sandy loam that has 1 to 9 percent slopes; 35 percent Adelino fine sandy loam that has 1 to 5 percent slopes; and 15 percent other soils. It occurs in the eastern part of the survey area. The soils were surveyed at low intensity.

The Agustin soil occurs mainly on long, low convex ridges and piedmont fans. It has a profile similar to the one described as representative of the series, except that fine gravel makes up about 10 to 30 percent of the soil.

The Adelino soil occurs on concave fans between ridges or in long, narrow concave swales. It has a profile similar to the one described as representative of the series, except that gravel makes up 5 to 10 percent of the soil.

Included in the areas mapped are about 10 percent Tres Hermanos and Wink soils, and about 5 percent soils that contain more than 35 percent gravel.

Runoff is medium, and the hazard of erosion is moderate.

The soils in this association are used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Akela Series

The Akela series consists of well-drained soils that are 10 to 20 inches deep to bedrock. These soils formed in wind-laid sediment and material weathered from basalt lava flows. The vegetation is principally mid grasses, shrubs, and annuals. Slopes are 1 to 50 percent. Soils of the Akela series are associated with soils of the Alemeda series.

Elevations range from 4,900 to 6,000. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown, calcareous stony sandy loam about 8 inches thick. The next layer is very pale brown, calcareous very gravelly sandy loam about 10 inches thick. Below this material is basalt bedrock, which begins at a depth of about 18 inches.

Permeability is moderate. The available water capacity is 1 inch to 1.5 inches. The effective rooting depth is 10 to 20 inches.

Akela soils are used as range, wildlife habitat, and watershed.

Representative profile of Akela stony sandy loam, from an area of Rock outcrop-Akela complex, 10 to 50 percent slopes, about 2.5 miles west of Los Lunas and 1.6

miles south of New Mexico Highway 6, and 0.2 mile west of telephone transmission line:

A1—0 to 8 inches, brown (10YR 5/3, 10YR 4/3 moist) stony sandy loam; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 35 percent basalt gravel; 5 percent surface cover of stones and boulders; common fine threads of lime; slightly calcareous; moderately alkaline (pH 8.3); clear boundary. 4 to 9 inches thick.

Cca—8 to 18 inches, very pale brown (10YR 7/3) very gravelly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few fine interstitial pores and common very fine tubular pores; 55 percent basalt gravel; common fine threads and soft masses of lime; strongly calcareous; moderately alkaline (pH 8.4); diffuse boundary. 4 to 11 inches thick.

R—18 inches, fractured basalt bedrock, more dense and less fractured below 4 feet; the surface of the basalt and the fractures are coated with lime to depths of 6 feet.

The A horizon is brown or pale brown in color and gravelly fine sandy loam and stony sandy loam in texture. Coarse fragments make up 15 to 40 percent of the horizon. The Cca horizon is pink, pinkish gray, very pale brown, or light brown. Its texture is very gravelly sandy loam or very gravelly loam. Coarse fragments make up 35 to 60 percent of the Cca horizon. These fragments make up about 35 to 50 percent of the entire profile. The depth to bedrock ranges from 10 to 20 inches.

Akela-Rock outcrop complex, 1 to 9 percent slopes (AR).—This complex (fig. 2) is on gently undulating to gently rolling basalt flows in the north-central part of the survey area. It is about 65 percent Akela gravelly sandy loam, 1 to 9 percent slopes, and 25 percent Rock outcrop. Areas of this complex were surveyed at low intensity.

The Akela soil is in areas where a mantle of soil material overlies basalt bedrock. It has a profile similar to the one described as representative of the series, but the surface layer is gravelly fine sandy loam. The Rock outcrop part of this complex consists of bare exposed basalt.

Included in the areas mapped are areas of Alemeda and Bluepoint soils. These soils make up about 10 percent of the acreage.

Runoff is medium, and the hazard of erosion is slight to moderate.

This complex is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIs; Malpais SD range site; wildlife habitat group K.

Alemeda Series

The Alemeda series consists of well-drained soils on old basalt flows. These soils formed in mixed wind-laid materials weathered from basalt bedrock. The vegetation is principally mid grasses and shrubs. Slopes are 0 to 5 percent. Soils of the Alemeda series are associated with soils of the Madurez, Akela, and Wink series.

Elevations range from 5,000 to 5,600 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is light-brown loamy fine sand and brown fine sandy loam about 6 inches thick. The subsoil is brown sandy clay loam

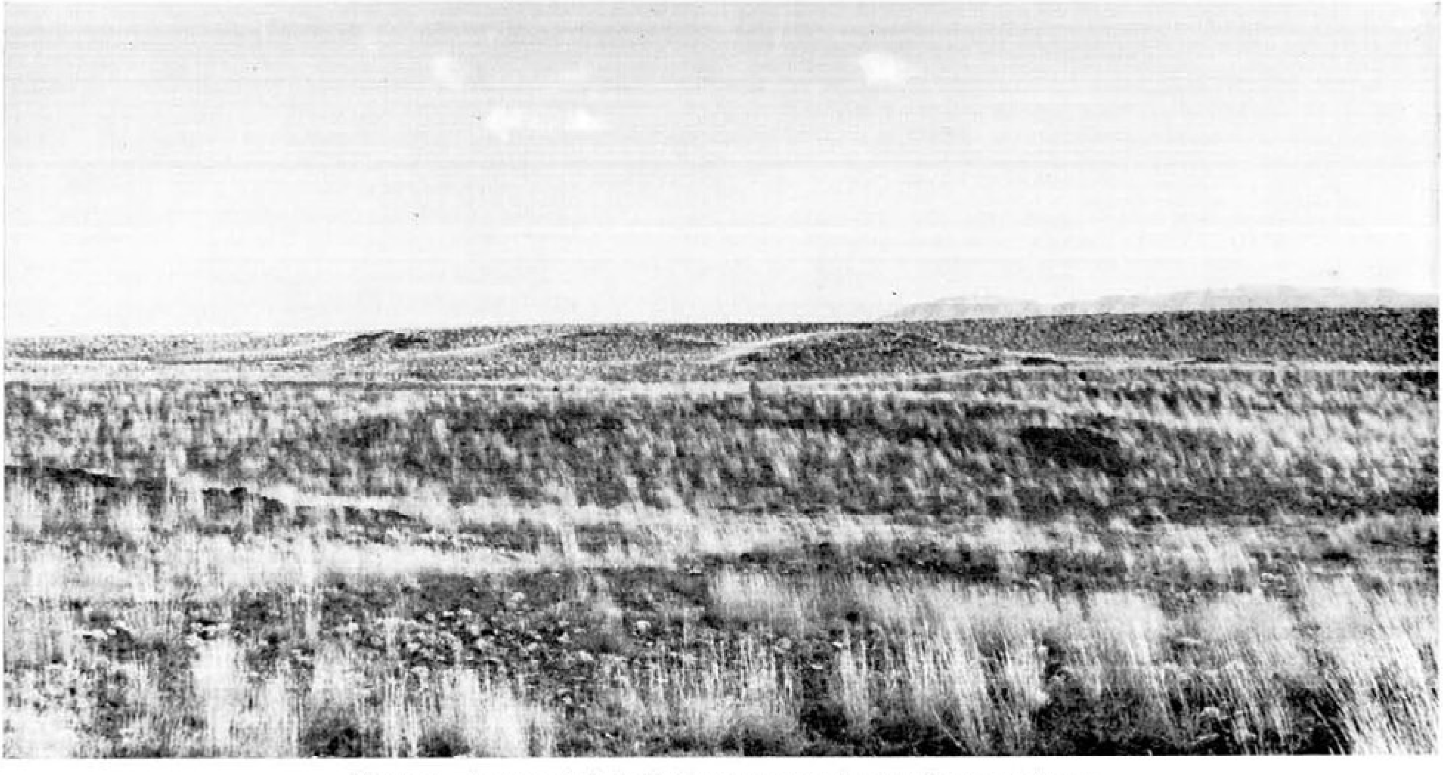

Figure 2.—An area of Akela-Rock outcrop complex, 1 to 9 percent slopes.

and light-brown gravelly loam about 12 inches thick. The substratum is pink very cobbly loam that has a high content of lime. Basalt bedrock begins at a depth of about 25 inches.

Permeability is moderate. The available water capacity is 2 to 3.5 inches. The effective rooting depth is 20 to 40 inches.

Alemeda soils are used as range, wildlife habitat, and watershed.

Representative profile of Alemeda loamy fine sand, 0 to 5 percent slopes, about 7 miles west and 1 mile north of Los Lunas; 0.52 mile west of eastern edge of basalt flow and 395 feet north of dim ranch trail, northwest of stock tank by railroad.

A11—0 to 3 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; noncalcareous, moderately alkaline (pH 8.1); abrupt boundary. 0 to 5 inches thick.

A12—3 to 6 inches, brown (7.5YR 5/4), 7.5YR 4/4 moist) fine sandy loam; weak, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few very fine tubular pores and common fine interstitial pores; disseminated lime; slightly calcareous, moderately alkaline (pH 8.1); clear boundary. 2 to 6 inches thick.

B2—6 to 15 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) sandy clay loam; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; few basalt pebbles; disseminated lime; slightly calcareous, moderately alkaline (pH 8.2); clear boundary. 8 to 12 inches thick.

B3ca—15 to 18 inches, light-brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 20 percent basalt gravel; thin coatings of lime on bottom of pebbles; common very fine threads of lime; moderately calcareous, strongly alkaline (pH 8.7); clear boundary. 3 to 6 inches thick.

IICca—18 to 25 inches, pink (7.5YR 7/4) very cobbly loam, brown (7.5YR 5/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular and common very fine interstitial pores; 75 percent basalt cobblestones and gravel; lime coatings on pebbles; common soft masses of lime; strongly calcareous, strongly alkaline (pH 8.6); abrupt boundary. 6 to 11 inches thick.

IIR—25 inches, basalt bedrock coated with lime.

The A horizon is brown or light-brown loamy fine sand and fine sandy loam. The B horizon is pale brown, light brown, or brown in color and ranges from sandy clay loam to gravelly loam in texture. The Cca horizon is pink, pinkish gray, or very pale brown. It ranges from very cobbly loam to very gravelly sandy loam in texture. Gravel and cobblestones make up 15 to 40 percent of the B3ca horizon and 35 to 80 percent of the Cca horizon. The depth to bedrock ranges from 20 to 40 inches.

Alemeda loamy fine sand, 0 to 5 percent slopes (AS).—This soil is on old basalt mesas in the north-central part of the survey area. The soil is gently undulating to undulating. It was surveyed at low intensity.

The acreage mapped as this soil consists of about 60 to 80 percent Alemeda soil and 10 to 30 percent Rock outcrop and Akela soils. Included in the areas mapped are areas of Madurez and Wink soils, which make up 5 to 15 percent of the mapping unit. Slopes range from 0 to 9 percent, but in most places slopes are 1 to 5 percent.

Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate to severe.

This Alemeda soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Anapra Series

The Anapra series consists of well-drained soils on the Rio Grande flood plain. These soils formed in recent alluvium. The native vegetation is principally alkali sacaton, saltgrass, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Anapra series are associated with soils of the Agua and Brazito series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is reddish-gray clay loam about 8 inches thick. The next layers are reddish-brown clay loam about 14 inches thick, light reddish-brown fine sandy loam about 6 inches thick, and pinkish-white sand to a depth of more than 60 inches.

Permeability is moderately slow above the substratum and is rapid below the substratum. The available water capacity is 5 to 7 inches. The effective rooting depth is 24 to 40 inches.

Anapra soils are used for irrigated hay, pasture, and wildlife habitat.

Representative profile of Anapra clay loam, about 1.15 miles west of Bosque Farms; 120 feet west of the west branch of Otero Lateral, and 60 feet south of Isleta Indian Reservation:

Ap—0 to 8 inches, reddish-gray (5YR 5/2) clay loam, dark reddish gray (5YR 4/3) moist; moderate, fine, subangular blocky structure; hard, firm, sticky and slightly plastic; many very fine and common fine roots; many very fine and fine tubular pores; few pressure faces on peds; moderately calcareous, moderately alkaline (pH 8.4); gradual boundary. 7 to 11 inches thick.

C1—8 to 22 inches, reddish-brown (5YR 5/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate, fine, subangular blocky structure; very hard, very firm, sticky and plastic; many very fine and few fine roots; many fine tubular pores; few pressure faces on peds; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 13 to 20 inches thick.

IIC2—22 to 28 inches, light reddish-brown (5YR 6/4) fine sandy loam, reddish brown (5YR 5/4) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many fine tubular pores and many interstitial pores; small amount of fine gravel; moderately calcareous, moderately alkaline (pH 8.4); abrupt boundary. 0 to 8 inches thick.

IIIC3—28 to 67 inches, pinkish-white (7.5YR 8/2) sand, pinkish gray (7.5YR 7/2) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; many fine interstitial pores; few pebbles; noncalcareous, moderately alkaline (pH 8.2).

The A horizon is reddish gray, reddish brown, or brown. Its texture is mostly clay loam or silty clay loam but ranges to clay in some profiles. The C1 horizon is reddish brown, pinkish gray, brown, or grayish brown. Its texture is heavy silt loam, silty clay loam, or clay loam. Clay makes up 25 to 35 percent of this horizon. The IIC horizon is discontinuous and is light reddish brown, pinkish gray, light brown, or pale brown. Its texture is loam, fine sandy loam, or light silt loam. The IIIC horizon is pinkish white, pinkish gray, light gray, or very pale brown. The texture of this horizon ranges from fine sand to coarse sand. Gravel makes up as much as 15 percent of the IIIC horizon but is not present in all profiles.

The Anapra soils in this survey area have a hue of 5YR, which is outside the range for the series, but this difference does not alter their usefulness and behavior.

Anapra clay loam (0 to 1 percent slopes) (At).—This level soil is in the irrigated Rio Grande valley.

In about 75 percent of the acreage, the soil has a hue of 5YR. In about 15 percent of the acreage, the hue is 7.5YR and 10YR, which is within the range for the series.

Included with this soil in mapping are areas of Belen and Agua soils. Also included are a few small tracts of this soil that are moderately saline and alkali. The included areas make up about 10 percent of the acreage.

Runoff is very slow, and the hazard of erosion is slight.

This Anapra soil is used for irrigated alfalfa, small grains, sorghums, pasture, and wildlife habitat. Capability unit IIs-5, irrigated; wildlife habitat group C.

Arizo Series

The Arizo series consists of excessively drained soils on alluvial fans. These soils formed in recent alluvium derived from granite and limestone. The native vegetation is principally mid grasses, annuals, and shrubs. Slopes are 0 to 3 percent. Soils of the Arizo series are associated with soils of the Nickel and Tome series.

Elevations range from 5,200 to 6,000 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown very gravelly loam about 6 inches thick. The next layers are brown and pale-brown very gravelly loamy sand to a depth of 60 inches or more.

Permeability is very rapid. The available water capacity is 2.5 to 4 inches. The effective rooting depth is 60 inches or more.

Arizo soils are used as range, wildlife habitat, and watershed. They are a source of sand and gravel and also of sedimentation.

Soils of the Arizo series are not mapped separately in this survey area. They are mapped only in a complex with Tome soils.

Representative profile of Arizo very gravelly loam, from an area of Tome-Arizo complex, about 9 miles east of Adelino; 0.25 mile north of the southern boundary of Tome Grant, 0.3 mile east-southeast of earthen stock tank and 10 feet north of ranch trail:

A1—0 to 6 inches, brown (10YR 5/3, 10YR 4/3 moist) very gravelly loam; very weak, fine, subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many fine interstitial pores; 40 percent gravel; noncalcareous, moderately alkaline (pH 8.0); clear boundary. 4 to 10 inches thick.

C1—6 to 30 inches, brown (10YR 5/3, 10YR 4/3 moist) very gravelly loamy sand; single grained; loose when dry or moist; nonsticky and nonplastic; many very fine roots; common fine interstitial pores; 50 percent gravel; thin coatings of lime on bottom of pebbles; slightly calcareous, moderately alkaline (pH 8.0); gradual boundary. 20 to 40 inches thick.

C2—30 to 60 inches, pale-brown (10YR 6/3) very gravelly loamy sand, yellowish brown (10YR 5/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; few very fine roots; common fine interstitial pores; 50 percent gravel; very thin coatings of lime on bottom of pebbles; slightly calcareous, moderately alkaline (pH 8.0).

The A horizon is brown or pale brown in color and ranges from very gravelly loam to very gravelly sandy loam in texture. Gravel makes up 35 to 50 percent of the horizon. The C horizon is brown, pale brown, or light yellowish brown in color and ranges from very gravelly loamy sand to very gravelly sand in texture. Gravel makes up 45 to 75 percent of the C horizon. Cobblestones and stones occur throughout the profile in places.

Armijo Series

The Armijo series consists of well-drained soils in old oxbow lakes or sloughs along the Rio Grande and the Rio Puerco. These soils formed in clayey alluvium. The native vegetation is principally alkali sacaton, saltgrass, fourwing saltbush, and annuals. Slopes are 0 to 1 percent. Soils of the Armijo series are associated with soils of the Belen, Glendale, and Tome series.

Elevations range from 4,750 to 5,400 feet. The average annual air temperature is 54° to 58° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 200 days.

In a representative profile the upper 3 inches of the surface layer is light brownish-gray clay loam. The lower 8 inches is pinkish-gray clay. The next layer is light-brown to pinkish-gray clay about 22 inches thick. The underlying layers, to depths of more than 60 inches, are pinkish-gray sandy clay and clay loam. The soil is mainly strongly saline and very strongly alkaline.

Permeability is very slow. The available water capacity is 2.5 to 3 inches. The effective rooting depth is 60 inches or more.

Armijo soils are used primarily as unimproved native pasture, wildlife habitat, and watershed. Some tracts are used for irrigated hay and small grains. Unless the soils are irrigated, they are subject to cracking (fig. 3). The

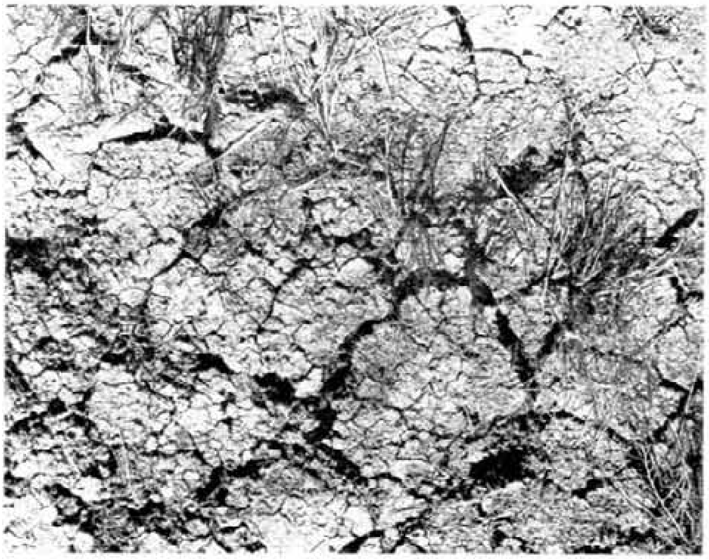

Figure 3.—**An area of Armijo clay. The cracks are half an inch to an inch wide and extend to depths of 20 to 30 inches.**

cracks that form are half an inch to an inch wide and extend to depths of 20 to 30 inches. Armijo soils are also used for community development in the area of Belen.

Representative profile of Armijo clay, in the northwest corner of Belen, 300 feet west of Castillo Chapel:

A11—0 to 3 inches, light brownish-gray (10YR 6/2) clay loam, brown (10YR 4/3) moist; strong, fine, subangular blocky structure; hard, very firm, sticky and plastic; many very fine and common fine roots; common very fine tubular pores; strongly saline; moderately calcareous, strongly alkaline (pH 8.9); clear boundary. 2 to 4 inches thick.

A12—3 to 11 inches, pinkish-gray (7.5YR 6/2) clay, brown (7.5YR 5/4) moist; strong, coarse, subangular blocky structure; very hard, very firm, very sticky and plastic; many very fine and common fine roots; many very fine tubular pores; strongly saline; moderately calcareous, very strongly alkaline (pH 9.2); clear boundary. 6 to 11 inches thick.

AC—11 to 28 inches, light-brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; very hard, very firm, very sticky and plastic; many very fine roots; common very fine tubular pores; intersecting slickensides; strongly saline; moderately calcareous, very strongly alkaline (pH 9.1); clear boundary. 15 to 25 inches thick.

C1—28 to 33 inches, pinkish-gray (7.5YR 6/2) light clay, brown (7.5YR 5/2) moist; massive; very hard, firm, sticky and plastic; many very fine roots; common very fine tubular pores; strongly saline; moderately calcerous, very strongly alkaline (pH 9.1); clear boundary. 3 to 10 inches thick.

C2—33 to 60 inches, pinkish-gray (7.5YR 6/2) sandy clay, brown (7.5YR 4/3) moist; massive; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; pockets of light sandy clay loam; strongly saline; moderately calcareous, very strongly alkaline (pH 9.1); diffuse boundary. 14 to 30 inches thick.

IIC3—60 to 73 inches, pinkish-gray (7.5YR 7/2) clay loam, brown (7.5YR 5/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; no roots; few very fine tubular pores; pockets of fine sandy loam; moderately saline; slightly calcareous, strongly alkaline (pH 8.7).

The A horizon is pinkish gray, light brownish gray, light brown, or brown. It ranges from clay loam to clay in texture. The AC and C horizons are pinkish gray, light brown, or brown. These horizons range from silty clay or clay to sandy clay in texture. They are slightly saline to strongly saline and strongly to very strongly alkaline. Intersecting slickensides or wedge-shaped structural aggregates occur in the AC horizon. The C horizon is about 20 to 40 percent exchangeable sodium. The IIC horizon begins at depths of 40 to more than 60 inches. It is light gray or pinkish gray.

Armijo clay, slightly saline (0 to 1 percent slopes) (Ay).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to that described as representative of the series, but the surface layer is brown clay, the soil is slightly saline and moderately alkaline, and exchangeable sodium is less than 15 percent.

Included with this soil in mapping are areas of Belen and Glendale soils and areas of Armijo loam, moderately alkali.

Runoff is very slow, and the hazard of erosion is slight. The available water capacity is 4 to 5 inches.

This Armijo soil is used primarily for irrigated alfalfa, small grains, and pasture. Capability unit IIIs-3, irrigated; wildlife habitat group F.

Armijo clay (0 to 1 percent slopes) (Aw).—This level soil is in the Rio Grande valley. It has the profile described as representative of the series. It is 30 to 50 percent exchangeable sodium. The areas have rough microrelief.

Included with this soil in mapping are areas of Belen and Glendale soils and areas of Armijo loam, moderately alkali.

Runoff is very slow, and the hazard of erosion is slight.

This Armijo soil is used primarily for unimproved native pasture. Small tracts have been leveled and used for irrigated alfalfa and small grains, but most of these tracts are now idle. A large acreage of this soil is in the city of Belen. Most of the areas used as homesites have proved unsuitable because of septic tank failure, cracking of foundations, and difficulty in landscaping and street maintenance. Dryland capability subclass VIIs; Salty Bottomland SD range site; wildlife habitat group F.

Armijo loam, moderately alkali (0 to 1 percent slopes) (Au).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to that described as representative of the series, but the surface layer is brown loam, the soil is moderately saline and strongly alkaline, and exchangeable sodium is about 15 percent in approximately 25 to 35 percent of the acreage.

Included with this soil in mapping are areas of another Armijo soil and areas of Belen and Glendale soils.

This Armijo soil is used for irrigated alfalfa, small grains, and permanent pasture; most of the acreage, however, is idle or is in unimproved native pasture. Capability unit IVs-5, irrigated; wildlife habitat group F.

Armijo sandy clay loam, nonsaline (0 to 1 percent slopes) (AV).—This level soil is in concave basins and drainageways in the north-central part of the survey area, west of the Rio Grande. It has a profile similar to that described as representative of the series, but the surface layer is sandy clay loam, about 14 inches thick, and overlies a layer of sandy clay about 31 inches thick. Also, this soil is nonsaline and is moderately alkaline. The acreage was surveyed at low intensity.

Included with this soil in mapping are areas of Tome, Madurez, and Wink soils.

Runoff is slow, and the hazard of erosion is slight. The available water capacity is 9 to 10 inches.

This soil is used as range, wildlife habitat, and watershed. One small tract has been used for irrigated row crops. Dryland capability subclass VIIs; Loamy SD range site; wildlife habitat group I.

Badland

Badland (BD) is on breaks along the Rio Grande and the Rio Puerco. The areas consist of gravelly land deeply dissected by V-shaped valleys and sharp ridges; bedded and weakly cemented sandstone, siltstone, and conglomerate lenses; and unconsolidated materials. The vegetation is very sparse, and in some places there is none. Slopes are mainly 25 to 75 percent. The areas were surveyed at low intensity. Badland is associated with soils of the Caliza, Bluepoint, and Wink series.

Elevations range from 4,800 to 5,600 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

The earth material in this land type (fig. 4) is highly stratified, highly variable, highly dissected old allu-

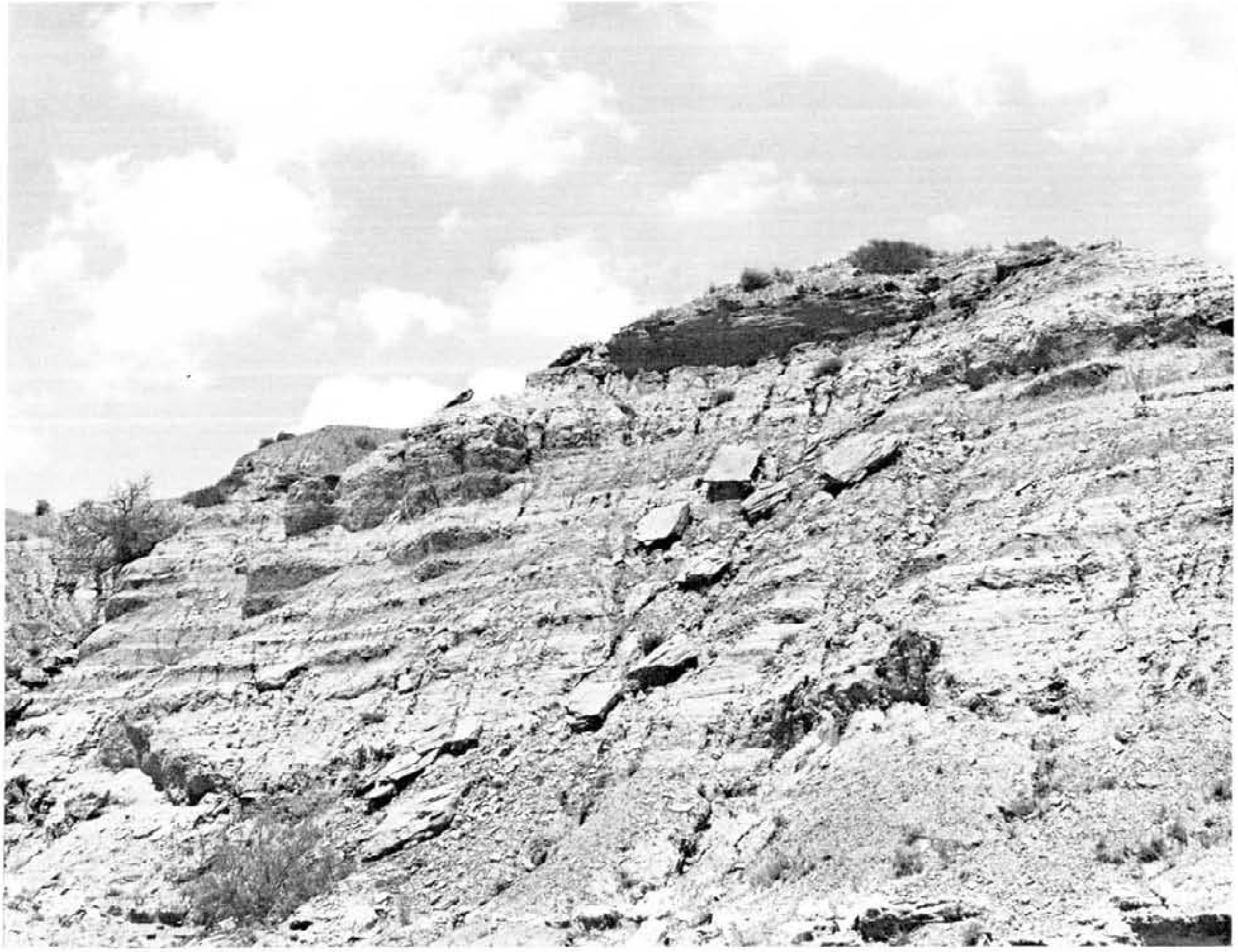

Figure 4.—**An area of Badland. The layered material is stratified old alluvium.**

vium that ranges from clay to sand and gravel. Most of the material is moderately coarse textured to coarse textured.

Permeability is variable. Runoff is rapid, and the hazard of erosion is severe. Badland is one of the main sources of sedimentation in this survey area.

This land type is used as watershed and wildlife habitat. Dryland capability subclass VIIIe; wildlife habitat group O.

Belen Series

The Belen series consists of well-drained soils on the flood plain of the Rio Grande. These soils formed in clayey alluvium of old oxbow lakes and are underlain by loamy alluvium. The native vegetation is principally alkali sacaton, saltgrass, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Belen series are associated with soils of the Armijo and Glendale series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is brown clay loam about 7 inches thick. The next layers are reddish-gray clay, about 24 inches thick, and light-brown fine sandy loam to a depth of 60 inches or more.

Permeability is slow. The available water capacity is 8.5 to 9.5 inches. The effective rooting depth is 60 inches or more.

Representative profile of Belen clay loam, about 2.5 miles southwest of Los Lunas; about 2,800 feet north and 2,000 feet west of the headquarters of the New Mexico penitentiary farm:

Ap—0 to 7 inches, brown (7.5YR 5/2) clay loam, dark brown (7.5YR 4/4) moist; weak, medium, subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; common very fine interstitial pores and few fine tubular pore; moderately calcareous, strongly alkaline (pH 8.5); abrupt boundary. 6 to 10 inches thick.

C1—7 to 31 inches, reddish-gray (5YR 5/2) clay, reddish brown (5YR 4/3) moist; few, fine, distinct mottles of reddish yellow (7.5YR 6/6) in the lower part; massive but has a few very weak, thin plates; very hard, very firm, very sticky and very plastic; common very fine roots in the upper part, but no roots in the lower part; common very fine tubular pores; few intersecting slickensides; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 20 to 26 inches thick.

IIC2—31 to 60 inches, light-brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; common, medium, faint mottles of reddish yellow (7.5YR 6/6); massive; slightly hard, very friable, nonsticky and nonplastic; no roots; common very fine interstitial pores and few very fine tubular pores; moderately calcareous, strongly alkaline (pH 8.7).

The A horizon has hues of 7.5YR or 10YR, values of 5 or 6 when the soil is dry, and chromas of 2 or 3 when dry and 2 to 4 when moist. It ranges from clay to clay loam in texture. The C1 horizon has hues of 5YR or 7.5YR, values of 5 or 6 when dry and 4 or 5 when moist, and chromas of 2 to 4 when dry or moist. It is silty clay to clay that is 45 to 65 percent clay. The upper part of the C1 horizon is free of mottles, but mottles are common in the lower part. In unirrigated areas, cracks about 1 to 2 centimeters wide extend to depths of 20 inches or more in most years.

The IIC2 horizon has hues of 7.5YR or 10YR, values of 6 or 7 when the soil is dry and 4 or 5 when moist, and chromas of 2 to 4 when dry or moist.

The IIC2 horizon ranges from loam to loamy very fine sand. Clay makes up less than 20 percent of this horizon. Mottles range from few to common in the IIC2 horizon.

The soil is slightly to strongly saline throughout the profile. At depths between 10 to 40 inches, the soil ranges from slightly calcareous to moderately calcareous, and calcium carbonate makes up less than 15 percent. Carbonates are mainly disseminated, but they range to a few fine, soft masses, threads, and thin coatings. The soil material ranges from moderately alkaline to very strongly alkaline.

Belen clay loam (0 to 1 percent slopes) (Bf).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Armijo and Glendale soils and areas where the soil is slightly saline.

Runoff is very slow, and the hazard of erosion is slight.

This Belen soil is used primarily for irrigated alfalfa, small grains, sorghum, permanent pasture, and wildlife habitat. Some tracts are idle. Some areas are in the city of Belen. Capability unit IIIs–3, irrigated; wildlife habitat group A.

Belen clay loam, moderately alkali (0 to 1 percent slopes) (Bg).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam or loam, the soil is moderately saline, and exchangeable sodium is about 15 percent in about 35 percent of the acreage. Commonly, a seasonal water table is at depths of 4 to 5 feet.

Included with this soil in mapping are areas of Armijo and Anapra soils.

Runoff is very slow, and the hazard of erosion is slight. The available water capacity is 2.5 to 3.0 inches.

This Belen soil is primarily in idle land, unimproved native pasture, and wildlife habitat. Small tracts are used for irrigated alfalfa, small grains, and permanent pasture. Capability unit IVs–5, irrigated; wildlife habitat group A.

Belen loam (0 to 1 percent slopes) (Be).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is loam or sandy clay loam about 10 inches thick.

Included with this soil in mapping are areas of Armijo, Anapra, and Glendale soils.

Runoff is very slow, and the hazard of erosion is slight.

This Belen soil is used primarily for irrigated alfalfa, small grains, sorghums, and wildlife habitat. One tract of this soil near Los Lunas has been used for a lake and recreational facilities. Capability unit IIs–2, irrigated; wildlife habitat group A.

Bluepoint Series

The Bluepoint series consists of somewhat excessively drained soils on valley fill alluvial fans along the Rio Grande and on sandy mesas and the piedmont. These soils formed in sandy alluvium that has been modified by wind in many places. The native vegetation is principally mid and tall grasses and shrubs. Slopes are 1 to 35 percent. Soils of the Bluepoint series are associated with soils of the Madurez and Wink series.

Elevations range from 4,900 to 5,700 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 210 days.

In a representative profile the surface layer is light-brown loamy fine sand about 5 inches thick. The underlying layers are light-brown loamy sand and loamy fine sand to depths of more than 60 inches.

Permeability is rapid. The available water capacity is 4 to 5.5 inches. The effective rooting depth is more than 60 inches.

Bluepoint soils are used primarily for native pasture and wildlife habitat. They are also used for irrigated hay and orchards and for community development.

Representative profile of Bluepoint loamy fine sand, 1 to 9 percent slopes, 0.3 mile southeast of northwest corner of sec. 1, T. 6 N., R. 2 W., 6 feet east of pipeline of El Paso Natural Gas Company:

A1—0 to 5 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; many fine roots; common fine interstitial pores; slightly calcareous, moderately alkaline (pH 8.0); clear boundary. 4 to 9 inches thick.

C1—5 to 24 inches, light-brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; common fine interstitial pores; slightly calcareous, moderately alkaline (pH 8.0); gradual boundary. 15 to 24 inches thick.

C2—24 to 42 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; slightly calcareous, moderately alkaline (pH 8.0); gradual boundary. 15 to 20 inches thick.

C3—42 to 62 inches, light-brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; common fine interstitial pores; slightly calcareous, moderately alkaline (pH 8.0).

The A horizon is light brown or brown in color and ranges from loamy fine sand to loamy sand. The C horizon is pale brown, light yellowish brown, light brown, or brown. The texture ranges from loamy fine sand to sand; some profiles contain thin strata of light sandy loam. The incidence of lime in the C horizon ranges from disseminated particles to a few threads. Gravel ranges from 0 to 15 percent throughout the profile.

Bluepoint fine sand, rolling (BH).—This gently rolling to rolling soil occurs as low dunes, 8 to 40 feet high, of reworked sand on the piedmont west of the Rio Grande. It has a profile similar to that described as representative of the series, but the surface layer is fine sand. Also, the soil is noncalcareous and lacks gravel throughout the profile. This soil was surveyed at low intensity.

Included with this soil in mapping are areas of Bluepoint loamy fine sand, hummocky.

Runoff is slow. The hazard of soil blowing is severe.

This Bluepoint soil is used as range and wildlife habitat. Dryland capability subclass VIIe; Sand Hills SD range site; wildlife habitat group D.

Bluepoint loamy fine sand, 1 to 3 percent slopes (Bm).—This gently sloping soil is in valley fill areas along the margins of the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is light sandy loam in some places where the soil has been irrigated for several years.

Included with this soil in mapping are small areas of Gila and Vinton soils.

Runoff is slow. The hazard of erosion is moderately severe in irrigated areas.

This Bluepoint soil is used primarily for native pasture, irrigated alfalfa, orchards, community development, and wildlife habitat. It has been bench leveled in areas used for irrigated crops. Capability unit IIIe-1, irrigated; dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group C.

Bluepoint loamy fine sand, 1 to 9 percent slopes (Bn).—This nearly level to moderately sloping soil is on valley fill alluvial fans. It has a profile similar to the one described as representative of the series, but the surface layer is pink loamy fine sand about 10 inches thick. The areas are dissected by arroyos.

Included with this soil in mapping are small areas of Bluepoint loamy fine sand and areas of sandy soils that have 15 to 30 percent gravel.

Runoff is slow. The hazard of water erosion is moderate and the hazard of soil blowing is severe.

This Bluepoint soil is used for range, wildlife habitat, watershed, and community development. It is also a source of sand and road fill. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group D.

Bluepoint loamy fine sand, 1 to 9 percent slopes (BO).—This nearly level to moderately sloping soil is on valley fill alluvial fans and side slopes. It has the profile (fig. 5) described as representative of the series. The areas are dissected by a few arroyos. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of Wink soils; Bluepoint loamy fine sand, hummocky; and sandy soils that have 15 to 30 percent gravel.

Runoff is slow. The hazard of soil blowing is severe, and the hazard of water erosion is moderate.

This Bluepoint soil is used as range, wildlife habitat, community development, and watershed. It is a source of sedimentation during high-intensity storms. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group D.

Bluepoint loamy fine sand, hummocky (BP).—This gently undulating to gently rolling soil is on the piedmont west of the Rio Grande. It is subject to soil blowing, and hummocks, 2 to 5 feet high, have formed. The profile is similar to the one described as representative of the series, but the surface layer is brown loamy fine sand about 12 inches thick. A few scattered arroyos occur on alluvial fans. Areas of this soil were surveyed at low intensity.

Included with this soil in mapping are areas of miscellaneous land types and areas of soils that are moderately deep to sandstone in the western part of the survey area. Also included are areas of Bluepoint fine sand, rolling.

Runoff is slow. The hazard of soil blowing is severe.

This Bluepoint soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group D.

Bluepoint loamy sand, hilly (BK).—This soil is along the terraces of the Rio Grande and the Rio Puerco. It has a profile similar to the one described as representative of the series, but gravel makes up 10 to 25 percent of the soil material. The soil is rolling to hilly, and the slopes are complex. It is dissected by many arroyos. It was surveyed at low intensity.

Included with this soil in mapping are areas of Pajarito and Caliza soils and areas of miscellaneous land types. The inclusions make up about 10 percent of the acreage.

Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of soil blowing is moderate.

This Bluepoint soil is used as watershed, wildlife habitat, and range. It is a source of sedimentation. The vege-

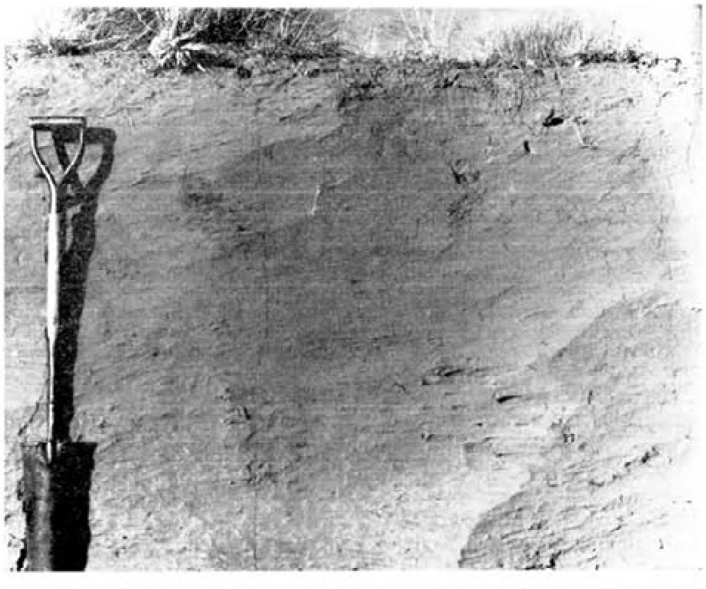

Figure 5.—Profile of Bluepoint loamy fine sand, 1 to 9 percent slopes.

tation is a sparse growth of mid grasses and shrubs. Dryland capability subclass VIIe; River Breaks SD range site; wildlife habitat group K.

Bluepoint sandy clay loam, 1 to 3 percent slopes (Br).—This gently sloping soil is in valley fill areas along the margins of the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is sandy clay loam about 7 inches thick. The surface layer formed in fine particles from silty irrigation water.

Included with this soil in mapping are areas of Gila and Vinton soils and areas of Bluepoint loamy fine sand, 1 to 3 percent slopes.

Runoff is medium. The hazard of water erosion is moderately severe.

This Bluepoint soil is used primarily for irrigated alfalfa, orchards, and wildlife habitat. Some traces are idle or are used for community development. Most irrigated areas have been bench leveled. Capability unit IIIe–2, irrigated; wildlife habitat group C.

Bluepoint-Adelino association, hummocky (BT).—This association is along the Rio Puerco in the western part of the survey area. It is about 65 percent Bluepoint loamy sand that has 1 to 5 percent slopes, and about 30 percent Adelino loamy sand that has 1 to 3 percent slopes. The areas have rough microrelief, and hummocks, 6 inches to 2 feet high, have formed. Sandy arroyos fan out and terminate within this association. The soils were surveyed at low intensity.

The Bluepoint soil is on upper valley fill side slopes. It has a profile similar to the one described as representative of the Bluepoint series, but the surface layer is loamy sand about 12 inches thick.

The Adelino soil is on lower valley fill side slopes. It has a profile similar to the one described as representative of the Adelino series, but the surface layer is pale-brown loamy sand about 6 inches thick. Also, it contains less segregated lime in the lower part of the subsoil. The hazard of soil blowing is severe.

Included with the areas mapped are areas of Tome soils. The included areas make up about 5 percent of the acreage.

This association is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; the Bluepoint soil is in Deep Sand SD range site and wildlife habitat group D; the Adelino soil is in Sandy SD range site and wildlife habitat group E.

Bluepoint-Wink complex, hummocky (Bs).—This complex is about 65 percent Bluepoint loamy sand that has 1 to 9 percent slopes, and 25 percent Wink loamy sand that has 1 to 5 percent slopes. The areas are on uplands in the eastern part of the survey area.

The Bluepoint soil is gently undulating to gently rolling. It has a profile similar to the one described as representative of the series, but the surface layer is loamy sand about 9 inches thick. Hummocks and low stabilized dunes have formed, and these dunes are 3 to 10 feet high.

The Wink soil occurs on uplands between low dunes. It is mainly gently undulating to undulating. Its profile is similar to that described as representative of the Wink series, but the surface layer is loamy sand about 6 inches thick. Runoff is slow. The hazard of soil blowing is severe.

Included in the areas mapped as this complex are areas of Madurez and Pajarito soils. Soils of each of these series make up about 5 percent of the acreage.

This complex is used as range, wildlife habitat, community development, and watershed. Dryland capability subclass VIIe; Deep Sand SD range site; the Bluepoint soil is in wildlife habitat group D; the Wink soil is in wildlife habitat group E.

Brazito Series

The Brazito series consists of well-drained sandy soils on sand bars of the Rio Grande flood plain. These soils formed in recent sandy alluvium. The vegetation is principally alkali sacaton, saltgrass, fourwing saltbush, and screwbean mesquite. Slopes are 0 to 1 percent. Soils of the Brazito series are associated with soils of the Agua and Vinton series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is brown loamy fine sand and pale-brown sand about 11 inches thick. The next layer is pale-brown sand to a depth of more than 60 inches.

Permeability is rapid. The available water capacity is 3 to 3.75 inches. The effective rooting depth is 4 to 16 inches, but it is limited for most plants by the low available water capacity of the sand substratum.

Brazito soils are used primarily for native pasture, irrigated hay, small grains, permanent pasture, wildlife habitat, and community development.

Representative profile of Brazito loamy fine sand, about 1 mile southeast of Los Lunas; 0.1 mile north of the Los Lunas sewage-disposal plant, 26 feet south and 120 feet west of cottonwood tree:

Ap1—0 to 7 inches, brown (10YR 5/3, 10YR 4/3 moist) loamy fine sand; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and common fine roots; few very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.3); abrupt boundary. 4 to 10 inches thick.

Ap2—7 to 11 inches, pale-brown (10YR 6/3) sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; noncalcareous, moderately alkaline (pH 8.0); gradual boundary. 0 to 6 inches thick.

C—11 to 65 inches, pale-brown (10YR 6/3) sand, brown (10YR 4/3) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; common very fine interstitial pores; noncalcareous, moderately alkaline (pH 8.0).

The A horizon is pink, light brown, very pale brown, pale brown, or brown. Its texture is light fine sandy loam to loamy fine sand. The C horizon is pink, light brown, very pale brown, or pale brown. The texture of this horizon is fine sand to coarse sand that has 0 to 15 percent gravel.

Brazito loamy fine sand (0 to 1 percent slopes) (Bu).—This nearly level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the Brazito series. The soil commonly has rough microrelief in areas that are not farmed.

Included with this soil in mapping are areas of a Brazito sandy clay loam and areas of Agua soils.

Runoff is very slow. The hazard of soil blowing is severe.

This Brazito soil is used for unimproved native pasture, irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. Some areas are commonly idle. Small tracts are used for community development. Capability unit IVe-1, irrigated; wildlife habitat group C.

Brazito soils, moderately alkali (0 to 1 percent slopes) (Bv).—This level soil is in the irrigated Rio Grande valley. In most places it has rough microrelief.

This soil has a profile similar to the one described as representative of the series. In about 35 percent of the acreage, the surface layer is strongly to very strongly alkaline and has more than 15 percent exchangeable sodium. The alkali condition can be reduced by special management practices. In about 50 percent of the acreage, the surface layer is loam or sandy clay loam.

Included with this soil in mapping are areas of Agua soils and areas of a moderately saline Brazito soil.

The hazard of soil blowing is moderate to severe.

This Brazito soil is used primarily for unimproved pasture and wildlife habitat. Small tracts are idle, and small tracts are used for community development. Capability unit IVs-1, irrigated; wildlife habitat group C.

Brazito sandy clay loam, thick surface (0 to 1 percent slopes) (Bw).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is brown sandy clay loam about 15 inches thick. The texture of the surface layer is the result of the mixing of fine particles from silty irrigation water with the underlying sand by plowing.

Included with this soil in mapping are areas of Agua loam and a Brazito loam.

Permeability is moderate to the underlying, strongly contrasting layer of fine sand. It is rapid in the fine sand and below. Runoff is very slow, and the hazard of erosion is slight. The available water capacity is 4 to 5 inches.

This Brazito soil is used primarily for irrigated alfalfa and wildlife habitat. Many areas are in unimproved native pasture. Small tracts are used for community development. Capability unit IIIs-2, irrigated; wildlife habitat group C.

Brazito sandy clay loam, thick surface, moderately saline (0 to 1 percent slopes) (Bx).—This level soil is in the Rio Grande valley. It commonly has rough microrelief.

The profile is similar to the one described as representative of the series, but the surface layer is sandy clay loam about 14 inches thick. The soil contains about 0.40 percent soluble salts and commonly has a thick crust of salts on the surface. The water table is at a depth of about 30 inches. In about 15 percent of the acreage, the soil has a surface layer, 2 or 3 inches thick, that is very strongly alkaline and has more than 15 percent exchangeable sodium.

Included with this soil in mapping are areas of Agua soils and areas of other Brazito soils that are moderately saline.

Most of the acreage of this Brazito soil is used for native unimproved pasture and wildlife habitat. A small tract north of Belen is used for community development. Capability unit IVw-1, irrigated; wildlife habitat group C.

Caliza Series

The Caliza series consists of well-drained soils on fan terraces and rolling hills. These soils formed in gravelly alluvium. The vegetation is principally short grasses, shrubs, and one-seed juniper. Slopes are 1 to 25 percent. Soils of the Caliza series are associated with soils of the Latene, Bluepoint, and Pajarito series.

Elevations range from 4,900 to 5,800 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile (fig. 6) the surface layer is very pale brown very gravelly sandy loam about 6 inches thick. The underlying layers are light-gray very gravelly loamy sand that has a high content of lime to a depth of 60 inches or more.

Permeability is moderately rapid. The available water capacity is 2 to 3 inches. The effective rooting depth is 20 to 40 inches.

Caliza soils are used for range, watershed, recreation, and wildlife habitat. These soils are a good source of sand and gravel. They are also a source of sedimentation.

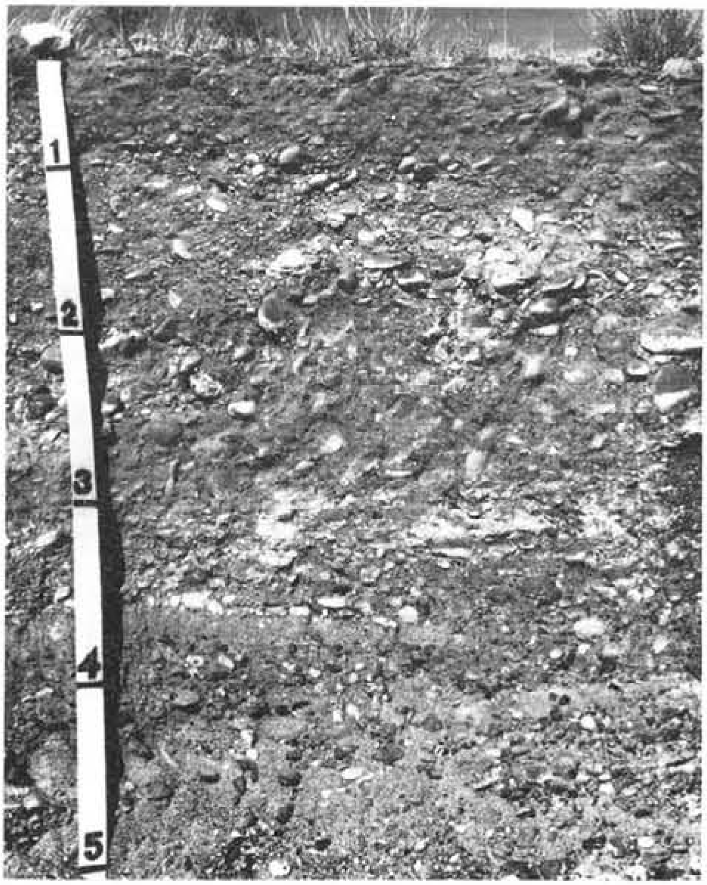

Figure 6.—Profile of Caliza very gravelly sandy loam. This soil is about 60 percent gravel.

Representative profile of Caliza very gravelly sandy loam, from an area of Caliza-Bluepoint complex, 1 to 25 percent slopes, 0.8 mile south of gravel pit and 250 feet north of fence corner, NE¼SW¼ sec. 6, T. 6 N., R. 3 E.:

A1—0 to 6 inches, very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; 40 percent gravel; strongly calcareous, moderately alkaline (pH 8.2); clear boundary. 3 to 8 inches thick.

C1ca—6 to 23 inches, light-gray (10YR 7/2) very gravelly loamy sand, very pale brown (10YR 7/3) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; 70 percent gravel; pebbles are strongly coated with lime; strongly calcareous, moderately alkaline (pH 8.2); clear boundary. 10 to 20 inches thick.

C2ca—23 to 60 inches, light-gray (10YR 7/2) very gravelly loamy sand, very pale brown (10YR 7/3) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; common fine interstitial pores; 70 percent coarse fragments coated with lime; strongly calcareous, moderately alkaline (pH 8.2).

The A horizon is very pale brown, light yellowish brown or brown. The texture of this horizon ranges from gravelly loam to very gravelly loamy sand. The gravel content ranges from 10 to 40 percent in the A horizon. The Cca horizon is light gray or very pale brown. The gravel content ranges from 40 to 80 percent in the C horizon.

Caliza-Bluepoint complex, 1 to 25 percent slopes (Cb).—This complex is east of the Rio Grande. It is mainly about 50 percent Caliza very gravelly sandy loam that has 5 to 25 percent slopes, and 40 percent Bluepoint gravelly sandy loam that has 1 to 9 percent slopes. The soils (fig. 7) are mainly undulating to hilly.

The Caliza soil is gently rolling to hilly. It has the profile described as representative of the series. Runoff is rapid, and the hazard of water erosion is severe.

The Bluepoint soil is gently undulating to gently rolling. It has a profile similar to the one described as representative of the series, but the surface layer is 15 to 40 percent gravel and the substratum is 5 to 20 percent gravel. Runoff is medium, and the hazard of erosion is moderate.

Included in the areas mapped are areas of Latene and Wink soils and of miscellaneous land types that make up about 10 percent of the acreage.

This complex is used for range, watershed, recreation, and wildlife habitat. The soils are a source of sedimentation during high-intensity storms. The Caliza soils are a source of sand and gravel. Dryland capability subclass VIIe; River Breaks SD range site; wildlife habitat group K.

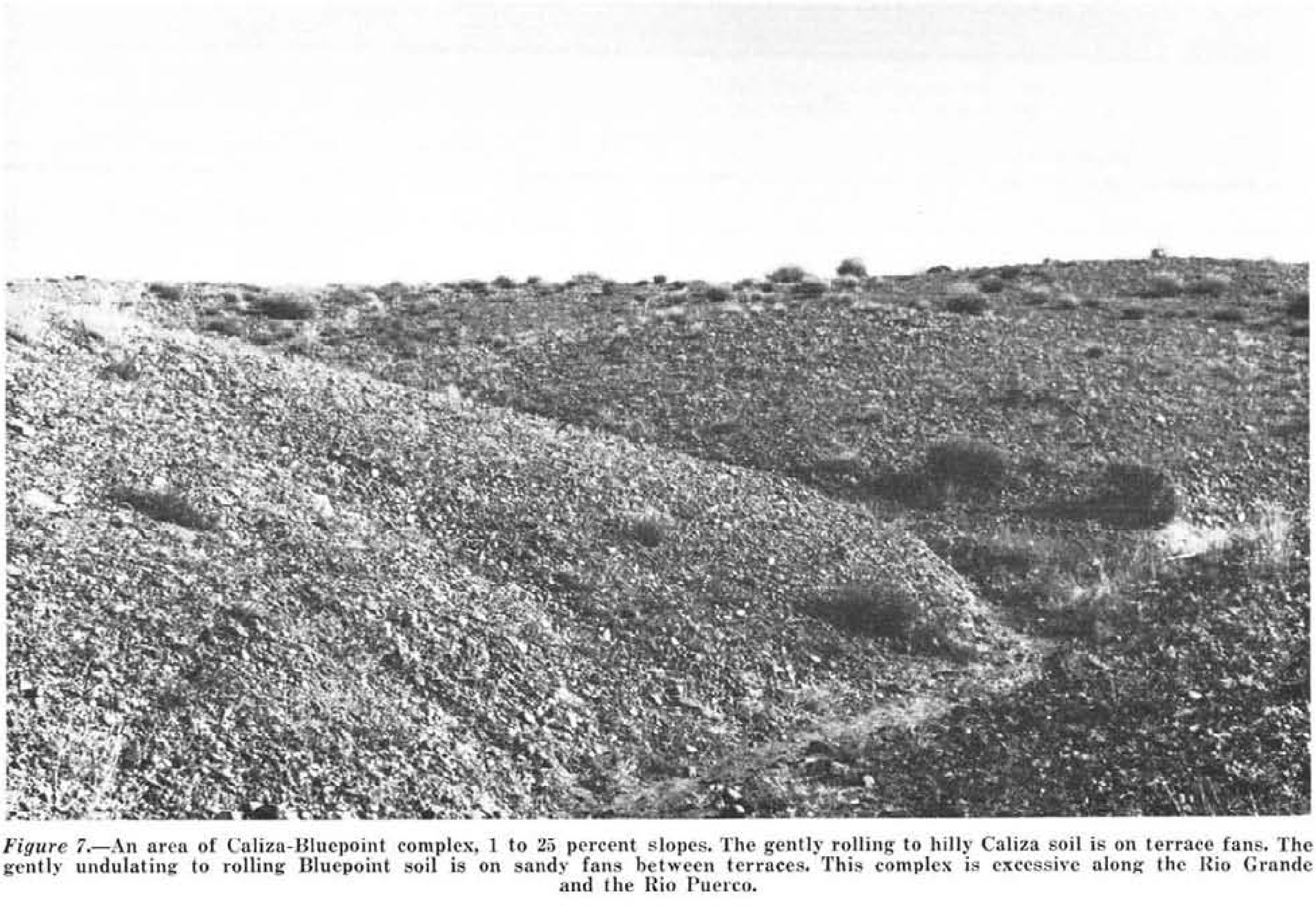

Figure 7.—An area of Caliza-Bluepoint complex, 1 to 25 percent slopes. The gently rolling to hilly Caliza soil is on terrace fans. The gently undulating to rolling Bluepoint soil is on sandy fans between terraces. This complex is excessive along the Rio Grande and the Rio Puerco.

Caliza-Bluepoint complex, 1 to 25 percent slopes (CE).—This complex is about 50 percent Caliza very gravelly sandy loam that has 5 to 25 percent slopes, and 30 percent Bluepoint gravelly sandy loam that has 1 to 9 percent slopes. The soils were surveyed at low intensity.

The rolling to hilly Caliza soil is on narrow terrace ridges. It has a profile similar to the one described as representative of the series, but the surface layer is pale-brown very gravelly sandy loam about 8 inches thick. Runoff is rapid, and the hazard of water erosion is severe.

The Bluepoint soil is strongly sloping to gently rolling. It has a profile similar to the one described as representative of the series, but the surface layer is gravelly sandy loam about 9 inches thick. Runoff is medium, and the hazard of erosion is moderate.

Included in the areas mapped are areas of Nickel, Latene, and Wink soils, and of miscellaneous land types. These included areas make up about 20 percent of the acreage.

This complex is used for range, watershed, recreation, and wildlife habitat. The soils are used as a source of sedimentation during high-intensity storms. A few tracts of the Caliza soil are used as a source of sand and gravel. Dryland capability subclass VIIe; River Breaks SD range site; wildlife habitat group K.

Deama Series

The Deama series consists of well-drained soils on limestone hills. These soils formed in material weathered from limestone. The vegetation is principally mid grasses, one-seed juniper, and pinyon pine. Slopes are 15 to 50 percent. Soils of the Deama series are associated with soils of the Laporte and Pinon series.

Elevations range from 6,000 to 7,000 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is dark grayish-brown and grayish-brown, calcareous gravelly loam about 9 inches thick. The next layers are light brownish-gray, very pale brown, and white, calcareous very gravelly loam and very cobbly loam. Limestone bedrock is at a depth of about 19 inches.

Permeability is moderate. The available water capacity is 1.5 to 2.5 inches. The effective rooting depth is 8 to 20 inches.

Deama soils are used as range, wildlife habitat, and watershed.

Representative profile of Deama gravelly loam, from an area of Deama-Laporte association, steep; 0.1 mile west of the boundary of the Cibola National Forest, 2.5 miles north of the Socorro County line; NW¼NW¼ sec. 19, T. 3 N., R. 5 E.:

A11—0 to 6 inches, dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate, fine, granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores; 20 percent gravel; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 4 to 6 inches thick.

A12—6 to 9 inches, grayish-brown (10YR 5/2) gravelly loam, dark brown (10YR 3/3) moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine tubular pores; 20 percent gravel; disseminated lime; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 2 to 4 inches thick.

ACca—9 to 12 inches, light brownish-gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; massive; hard, friable, nonsticky and nonplastic; many very fine roots; few fine tubular pores; 35 percent gravel; common soft masses of lime; strongly calcareous, moderately alkaline (pH 8.0); clear boundary. 0 to 3 inches thick.

C1ca—12 to 16 inches, very pale brown (10YR 8/3) very gravelly loam, light brownish gray (10YR 6/2) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; 35 percent gravel; nearly continuous soft masses of lime; strongly calcareous, moderately alkaline (pH 8.4); clear boundary. 2 to 4 inches thick.

C2a—16 to 19 inches, white (2.5Y 8/2) very cobbly loam, light brownish gray (2.5Y 6/2) moist; massive; hard, friable, nonsticky and nonplastic; very few very fine roots; common very fine tubular pores; 45 percent limestone cobblestones; continuous, soft masses of lime; strongly calcareous, moderately alkaline (pH 8.4); clear boundary. 1 to 3 inches thick.

R—19 inches, grayish-brown (2.5Y 5/2) limestone bedrock, dark grayish brown (2.5Y 4/2) moist; thin coatings of lime on upper surface.

The A horizon is dark grayish brown, grayish brown, or brown. It ranges from gravelly loam to very gravelly loam in texture and contains 15 to 40 percent gravel. The AC horizon is light brownish gray or pale brown in color and very gravelly loam in texture. Gravel makes up 35 to 50 percent of the AC horizon. The Cca horizon is light gray, very pale brown, or white. It ranges from very gravelly loam to very stony loam in texture and contains 35 to 60 percent coarse fragments. The depth to the R horizon is 8 to 20 inches.

Deama-Laporte association, steep (DL).—This association (fig. 8) consists of about 40 percent Deama gravelly loam, 15 to 50 percent slopes, and 30 percent Laporte gravelly loam, 15 to 50 percent slopes. It is in the southeastern part of the survey area. The soils were mapped at low intensity.

The Deama soil in this association is moderately steep to steep. It has long slopes where there is a small accumulation of alluvial and colluvial material over the limestone bedrock. It has the profile described as representative of the series.

The Laporte soil is moderately steep to steep. It has short slopes between limestone outcrops. It has the profile described as representative of the Laporte series.

Included in the areas mapped are areas of a gravelly loam that is 20 to 30 inches deep over bedrock. These areas make up about 15 percent of the association. Also included are areas of limestone outcrops that make up about 10 percent of the acreage. The rest of the association consists of Dean and Pinon soils, which make up 5 percent of the acreage.

Runoff is rapid, and the hazard of water erosion is severe.

This association is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIs, Breaks CP range site; wildlife habitat group G.

Dean Series

The Dean series consists of well-drained soils on old alluvial fans. These soils formed in alluvial sediment

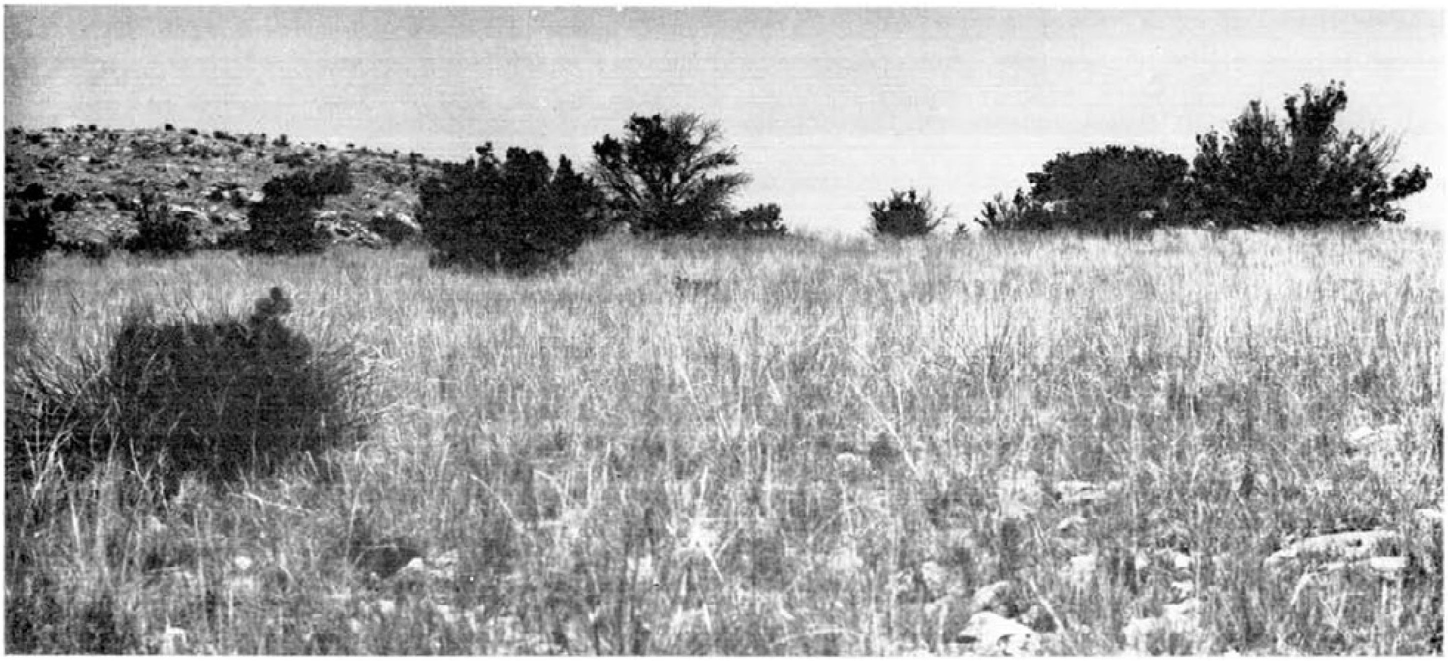

Figure 8.—An area in the Deama-Laporte association, steep. The soils formed over limestone bedrock.

derived primarily from limestone. They overlie gravel-sized fragments of caliche at depths of 8 to 17 inches. The vegetation is principally short and mid grasses. Slopes are 2 to 7 percent. Soils of the Dean series are associated with soils of the Pinon and Laporte series.

Elevations range from 5,800 to 6,300 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is light-brown, calcareous loam about 6 inches thick. The next layer is pinkish-gray, calcareous loam about 5 inches thick. This is underlain by white gravel-sized fragments of caliche to depths of 50 inches or more.

Permeability is slow. The available water capacity is 1.5 to 3 inches. The effective rooting depth is 8 to 17 inches.

Dean soils are used as range, wildlife habitat, and watershed.

Representative profile of Dean loam, from an area of Dean-Pinon association, gently sloping: 1.1 miles west of the Torrance County line and 0.2 mile north of the Socorro County line; NE¼SE¼ sec. 32, T. 3 N., R. 5 E.:

A1—0 to 6 inches, light-brown (7.5YR 6/3) loam, brown (7.5YR 4/3) moist; weak, fine and medium, subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and few fine roots; common very fine interstitial pores; few fine specks of lime; 5 percent gravel-sized fragments of caliche; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 4 to 10 inches thick.

AC—6 to 11 inches, pinkish-gray (7.5YR 7/2) loam, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; common soft masses and lime concretions; 5 percent gravel-sized fragments of caliche; moderately calcareous, moderately alkaline (pH 8.3); gradual boundary. 4 to 7 inches thick.

Cca—11 to 50 inches, white (10YR 8/2) gravel-sized fragments of caliche, very pale brown (10YR 7/3) moist; massive; hard, firm, nonsticky and nonplastic; few very fine roots decreasing with depth; common very fine tubular pores; few lime-coated limestone pebbles; many soft masses and cemented concretions of lime; strongly calcareous, strongly alkaline (pH 8.7).

The A horizon is brown, light brown, or pale brown. It ranges from loam to fine sandy loam in texture. The AC horizon is pale brown, light brownish gray, or pinkish gray. This horizon ranges from loam to gravelly loam in texture and contains 0 to 25 percent gravel-sized fragments of caliche. The Cca horizon is white or very pale brown. The lime in this horizon consists of indurated caliche. The fragments range from common to many. Soft masses of lime are between the fragments. Limestone bedrock commonly begins at depths between 3.5 and 5 feet.

Dean-Pinon association, gently sloping (DP).—This association (fig. 9) is in the southeastern part of the survey area. It is about 50 percent Dean loam, 2 to 7 percent slopes, and 35 percent Pinon loam, 3 to 10 percent slopes.

The Dean soil has the profile described as representative of the series. Slopes are long and gentle.

The Pinon soil is on the edge of ridges. It has the profile described as representative of the Pinon series. Slopes are short and gentle to strong.

Included in the areas mapped are areas of soils that are 20 to 35 inches deep to gravel-sized fragments of caliche. These soils make up about 10 percent of the acreage. The rest of the association consists of outcrops of limestone bedrock.

Runoff is medium. The hazard of water erosion is moderate on the Dean soils and severe on the Pinon soils.

This association is used as range, wildlife habitat, and

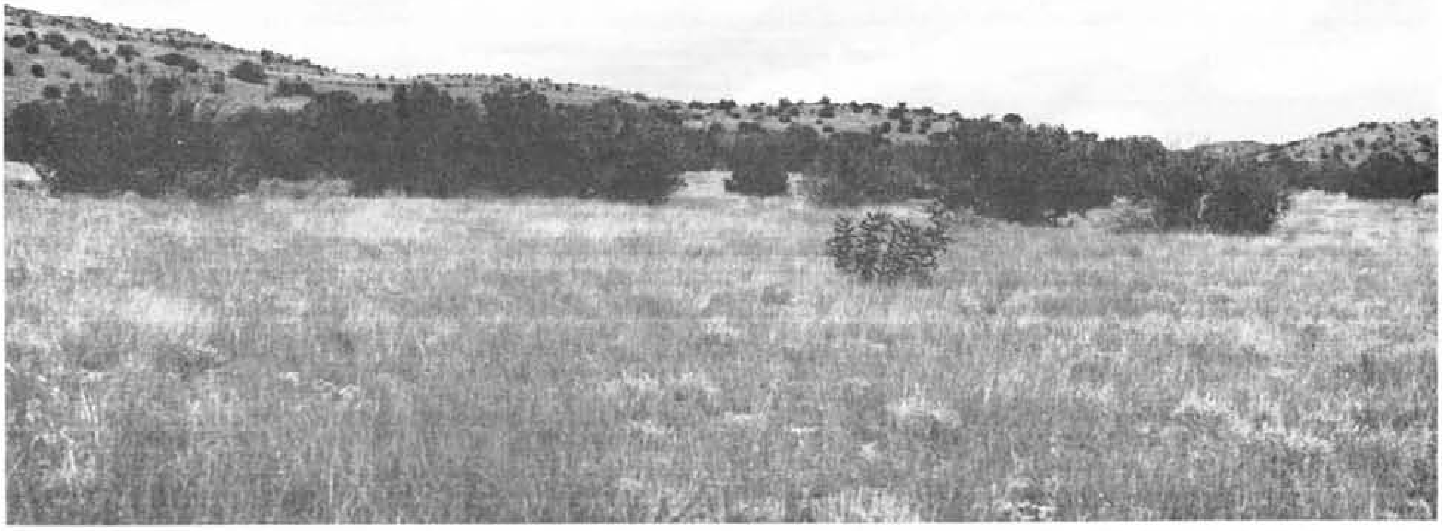

Figure 9.—The foreground of this picture shows an area of Dean-Pinon association, gently sloping. The hills in the background are occupied by Deama-Laporte association, steep. The trees are one-seed juniper and pinyon pine.

watershed. The Dean soil is in dryland capability subclass VIe, Loamy CP range site, and wildlife habitat group H. The Pinon soil is in dryland capability subclass VIIs, Shallow CP range site, and wildlife habitat group L.

Farb Series

The Farb series consists of excessively drained soils on sandstone ridges. These soils formed in material weathered from sandstone. The vegetation is principally short and mid grasses, shrubs, and one-seed juniper. Slopes are 5 to 15 percent. Soils of the Farb series are associated with soils of the Bluepoint, Wink, and Caliza series.

Elevations range from 5,400 to 6,200 feet. The average annual air temperature is 51° to 54° F., and the average annual precipitation is 9 to 12 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is light yellowish-brown, strongly calcareous gravelly sandy loam about 2 inches thick. The next layer is white, calcareous gravelly sandy loam about 7 inches thick. Sandstone bedrock begins at a depth of about 9 inches.

Permeability is moderately rapid. The available water capacity is 0.5 inch to 1.5 inches. The effective rooting depth is 7 to 13 inches.

Farb soils are used as watershed, range, and wildlife habitat.

Representative profile of Farb gravelly sandy loam, from an area of Farb-Rock outcrop complex, 5 to 25 percent slopes: northwest corner of SW¼ sec. 29, T. 6 N., R. 2 W., 8 feet east and 49 feet north of quarter corner brass cap:

A1—0 to 2 inches, light yellowish-brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/6) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; common fine interstitial pores; 25 percent gravel and stones; strongly calcareous, strongly alkaline (pH 8.5); clear boundary. 2 to 4 inches thick.

Cca—2 to 9 inches, white (N 8/0) gravelly sandy loam, light gray (10YR 7/2) moist; mottles of reddish yellow (7.5YR 6/6), brown (7.5YR 5/2) moist; massive; very hard, very firm, nonsticky and nonplastic; few very fine roots; many fine interstitial pores; 25 percent lime-cemented gravel; strongly calcareous, strongly alkaline (pH 8.5); clear boundary. 5 to 9 inches thick.

R—9 inches, white (10YR 8/2) sandstone bedrock, very pale brown (10YR 7/3) moist.

The A horizon is light yellowish brown or yellowish brown in color and gravelly sandy loam to sandy loam in texture. Gravel and stones make up 10 to 30 percent of the A horizon. The C horizon is white, light gray, or very pale brown. The depth to sandstone bedrock ranges from 7 to 13 inches.

Farb-Rock outcrop complex, 5 to 25 percent slopes (FR).—This complex is in the western part of the survey area. It is 50 percent Farb gravelly sandy loam, 5 to 25 percent slopes, and 25 percent Rock outcrop. Areas of this complex were surveyed at low intensity.

The Farb soil is on sides and tops of ridges. It has the profile described as representative of the series. The Rock outcrop part of the complex consists of a cap of consolidated sandstone over unconsolidated geologic material.

Included in the areas mapped are areas of eroded unconsolidated materials, which make up about 15 percent of the acreage. Also included are: areas of a soil that is 20 to 30 inches deep to sandstone, which make up about 3 percent of the acreage; areas of a gravelly, calcareous soil that has a low content of lime, which make up 5 percent; and areas of a deep, moderately coarse textured, alluvial soil along gullies, which make up 2 percent.

Runoff is medium to rapid, and the hazard of water erosion is severe.

This complex is used as watershed, range, and wildlife habitat. Dryland capability subclass VIIs; Shallow Sandstone WP range site; wildlife habitat group L.

Gila Series

The Gila series consists of well-drained soils on the Rio Grande flood plain. These soils formed in recent alluvium. They are stratified fine sandy loam, very fine sandy loam, and loam. The native vegetation is principally alkali sacaton, saltgrass, vine-mesquite, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Gila series are associated with soils of the Agua and Vinton series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is brown loam about 10 inches thick. The next layer is pink, pinkish-gray, and light-brown, stratified fine sandy loam, very fine sandy loam, and loam about 23 inches thick. Below this is very pale brown, pink, and light-brown, stratified loamy fine sand, fine sandy loam, and silt loam to a depth of 60 inches or more.

Permeability is moderate. The available water capacity is 8 to 10 inches. The effective rooting depth is 60 inches or more.

Gila soils are used for irrigated hay, small grains, row crops, pasture, orchards, wildlife habitat, and community development. They are also used for unimproved native pasture.

Representative profile of Gila loam, about 2 miles southwest of Los Lunas; 3,400 feet north of the headquarters of the New Mexico penitentiary farm; 255 feet south of Los Lunas Wasteway and 60 feet east of field ditch:

Ap—0 to 10 inches, brown (10YR 5/3) loam, dark yellowish brown (10YR 4/4) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); abrupt boundary. 8 to 12 inches thick.

C1—10 to 15 inches, light-brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary, 2 to 7 inches thick.

C2—15 to 18 inches, pink (7.5YR 7/4) very fine sandy loam, light brown (7.5YR 6/4) moist; massive; very hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.6); clear boundary. 2 to 10 inches thick.

C3—18 to 26 inches, pinkish-gray (7.5YR 6/2) loam, brown (7.5YR 5/4) moist; weak, fine, subangular blocky structure; very hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.6); clear boundary. 6 to 15 inches thick.

C4—26 to 33 inches, light-brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak, fine, subangular blocky structure; hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.7); clear boundary. 6 to 12 inches thick.

IIC5—33 to 42 inches, very pale brown (10YR 7/3) loamy fine sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.8); clear boundary. 0 to 12 inches thick.

IIIC6—42 to 54 inches, pink (7.5YR 7/4) fine sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.8); clear boundary. 10 to 16 inches thick.

IVC7—54 to 64 inches, light-brown (7.5YR 6/4) silt loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; moderately calcareous, strongly alkaline (pH 8.8).

The A horizon is pinkish gray, light brown, pale brown, or brown. Its texture is loam, heavy fine sandy loam, or very fine sandy loam. This horizon has weak, fine or medium, subangular blocky structure or is massive. The C horizon is light brown, pink, pinkish gray, pale brown, or very pale brown. It is fine sandy loam, very fine sandy loam, loam, or silt loam in texture and has strata of loamy fine sand. The clay content averages 10 to 18 percent at depths between 10 and 40 inches.

In mapping units Gd, Ge, Gf, Gg, Gh, Gk, Gm, and Gn about 20 percent of the acreage is finer textured than is defined in the range for the series. In these mapping units the soil is 18 to 24 percent clay. This difference, however, does not alter the usefulness or behavior of the soils.

Gila clay loam (0 to 1 percent slopes) (Gk).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam and is about 10 inches thick. Also, the surface layer is cloddy and is more difficult to till.

Included with this soil in mapping are areas of Agua and Glendale soils and of Gila loam.

Runoff is slow, and the hazard of erosion is slight.

This Gila soil is used primarily for irrigated alfalfa, small grains, row crops, permanent pasture, community development, and wildlife habitat. Capability unit I–2, irrigated; wildlife habitat group B.

Gila clay loam, slightly saline (0 to 1 percent slopes) (Gm).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam about 13 inches thick, the soil contains more than 0.18 percent soluble salts, and a seasonal water table is at a depth of 50 inches. In about 20 percent of the acreage, the surface layer is strongly alkaline and exchangeable sodium is more than 15 percent. Also, the available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Glendale and Vinton soils.

Runoff is slow, and the hazard of erosion is slight.

This Gila soil is used primarily for irrigated alfalfa, small grains, sorghums, and permanent pasture. It is also used for native unimproved pasture and wildlife habitat. Capability unit IIs–3, irrigated; wildlife habitat group B.

Gila clay loam, moderately alkali (0 to 1 percent slopes) (Gn).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam about 15 inches thick. In about 35 percent of the acreage, the surface layer is strongly alkaline to very strongly alkaline and has more than 15 percent exchangeable sodium. The soil material is dispersed and crusts easily. In many places the surface layer is moderately saline. Also, the available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Glendale and Agua soils.

Runoff is slow, and the hazard of erosion is slight.

Many areas of this Gila soil are idle, are used for native unimproved pasture, or are used as wildlife habitat. The soil is also used for irrigated alfalfa, small grains, and permanent pasture. Partial crop failure is common. Capability unit IIIs–5, irrigated; wildlife habitat group B.

Gila loam (0 to 1 percent slopes) (Gd).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Agua and Glendale soils. These soils make up about 10 percent of the acreage. Also included are areas of Gila loam (1 to 3 percent slopes) along the margins of the valley, that have been bench leveled in most places. The included areas of Gila loam make up about 5 percent of the acreage.

Runoff is very slow to slow, and the hazard of erosion is slight.

This Gila soil is used for irrigated alfalfa, small grains, row crops, orchards, permanent pasture, community development, and wildlife habitat. Small tracts are idle. Capability unit I–1, irrigated; wildlife habitat group B.

Gila loam, slightly saline (0 to 1 percent slopes) (Ge).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the soil has more than 0.18 percent soluble salts, and a seasonal water table is at a depth of 50 inches. Also, the available water capacity is 5 to 7 inches. White crusts of salts are common on the surface.

Included with this soil in mapping are areas of Vinton and Glendale soils.

Runoff is very slow to slow, and the hazard of erosion is slight.

This Gila soil is used primarily for irrigated alfalfa (fig. 10), small grains, sorghum, and permanent pasture. Capability unit IIs–3, irrigated; wildlife habitat group B.

Gila loam, strongly alkali (0 to 1 percent slopes) (Gg).—This level soil is in the irrigated Rio Grande valley. In most places it has rough microrelief. The profile is similar to the one described as representative of the series, but in about 50 percent of the acreage the surface layer is strongly alkaline to very strongly alkaline and has more than 15 percent exchangeable sodium. The soil material is dispersed; it crusts easily and takes in water slowly. The available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Gila clay loam, strongly alkali; and areas of Vinton and Glendale soils.

Runoff is slow, and the hazard of erosion is slight.

Many areas of this Gila soil are idle, are used for unimproved native pasture, or are used as wildlife habitat. Small tracts are used for irrigated alfalfa, small grains, permanent pasture, and community development. Crop failure is common. Capability unit IVs–4, irrigated; wildlife habitat group B.

Gila loam, strongly saline and alkali (0 to 1 percent slopes) (Gh).—This level soil is in the irrigated Rio Grande valley. In most places it has rough microrelief. The profile is similar to the one described as representative of the series, but the soil has more than 0.50 percent soluble salts, is very strongly alkaline, and has more than 25 percent exchangeable sodium. It has a seasonal water table at a depth of 48 inches. The soil material is dispersed; it crusts easily and takes in water slowly. The available water capacity is 5 to 7 inches. White crusts of salts are common on the surface.

Included with this soil in mapping are areas of Vinton soils and areas of Gila loamy fine sand, strongly alkali.

Runoff is slow, and the hazard of erosion is slight.

This Gila soil is commonly used for unimproved native pasture and wildlife habitat. Some areas are commonly idle. Small tracts are used for irrigated alfalfa, small grains, permanent pasture, and community development. Capability unit IVs–3, irrigated; wildlife habitat group B.

Gila loam, moderately alkali (0 to 1 percent slopes) (Gf).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but in about 35 percent of the acreage the surface layer is strongly alkaline to very strongly alkaline and has more than 15 percent exchangeable sodium. The soil material is dispersed, and it crusts easily. The water intake is moderately slow. The available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Armijo, Belen, and Glendale soils, and areas of Gila loam, strongly alkali.

Runoff is slow, and the hazard of erosion is slight.

This Gila soil is used for irrigated alfalfa, pasture, small grains, and wildlife habitat. Many tracts are idle or are in unimproved native pasture. Capability unit IIIs–5, irrigated; wildlife habitat group B.

Gila loamy fine sand (0 to 1 percent slopes) (Go).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is loamy fine sand and light fine sandy loam about 15 inches thick. The available water capacity is 7 to 9 inches.

Included with this soil in mapping are areas of Vinton soils, and areas of Gila soils that are slightly saline or moderately alkali.

Runoff is very slow. The hazard of soil blowing is moderate.

Many tracts of this Gila soil are in unimproved native pasture and are used as wildlife habitat. This soil is also used for irrigated alfalfa, small grains, and permanent pasture. Capability unit IIe–1, irrigated; wildlife habitat group B.

Gila loamy fine sand, strongly alkali (0 to 1 percent slopes) (Gc).—This level soil is in the irrigated Rio Grande valley. In most places it has rough microrelief. The profile is similar to the one described as representative of the series, but the surface layer is loamy fine sand about 13 inches thick. Also, in about 50 percent

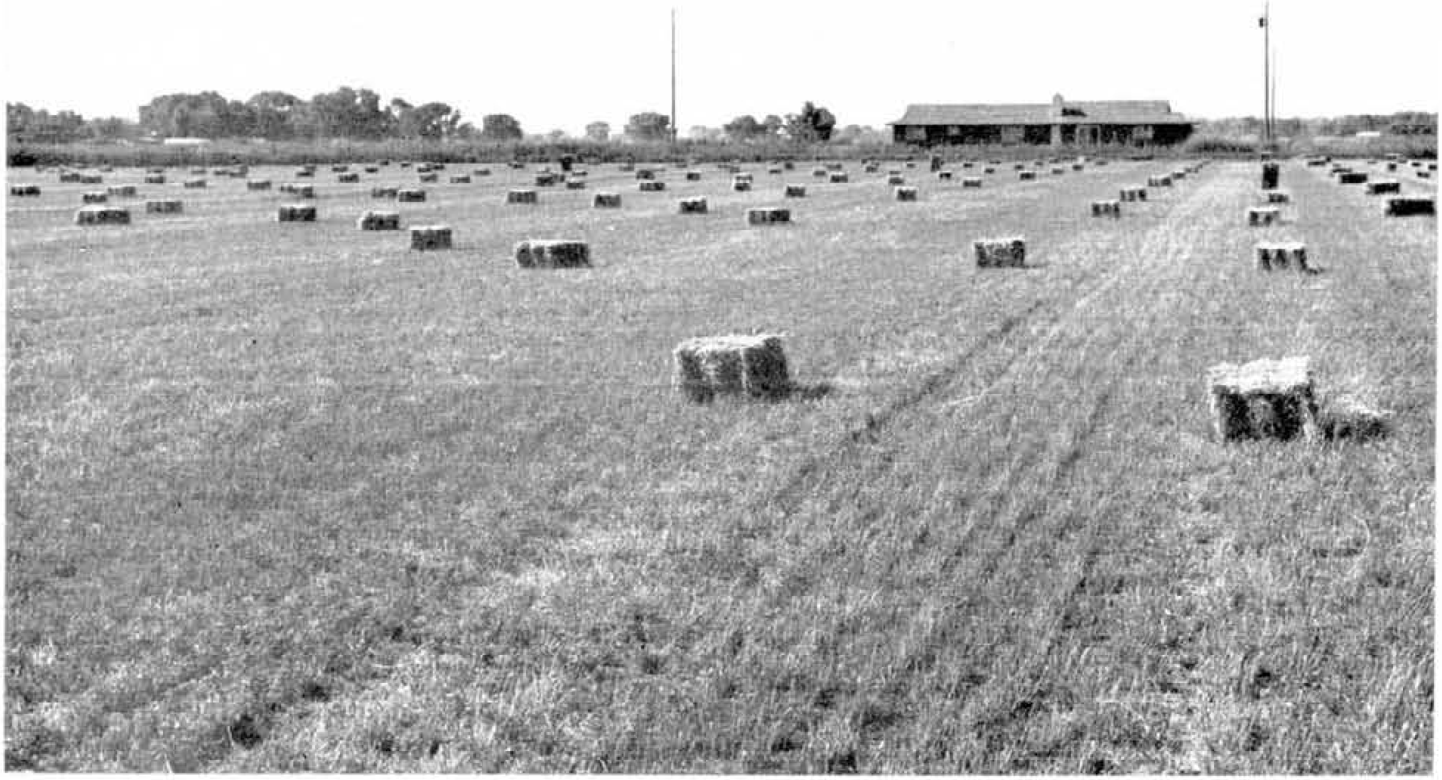

Figure 10.—**A field of baled alfalfa hay on Gila loam, slightly saline. This area is in the irrigated Rio Grande valley. The soil is in capability unit IIs-3, irrigated.**

of the acreage the surface layer is very strongly alkaline and has more than 25 percent exchangeable sodium. The soil material is dispersed. Because of soil dispersion, the rate of water intake is moderately slow. The available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Gila soils that are strongly saline and alkali, and areas of Agua soils.

Runoff is slow. The hazard of soil blowing is moderate.

Many tracts of this Gila soil are in unimproved native pasture, are idle, or are used as wildlife habitat. Some areas are also used for irrigated alfalfa, small grains, and permanent pasture. Crop failure is common. Capability unit IVs-4, irrigated; wildlife habitat group B.

Glendale Series

The Glendale series consists of well-drained soils on the Rio Grande flood plain. These soils formed in recent alluvium. The native vegetation is principally alkali sacaton, saltgrass, vine-mesquite, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Glendale series are associated with soils of the Gila and Armijo series.

Elevations range from 4,750 to 4,900 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is brown clay loam about 7 inches thick. The next layers are pinkish-gray and brown clay loam about 38 inches thick. Underlying these layers is pinkish-gray loam to a depth of 60 inches or more.

Permeability is moderately slow. The available water capacity is 10 to 12 inches. The effective rooting depth is 60 inches or more.

Glendale soils are used for irrigated hay, small grains, row crops, and pasture. They are also used for community development, native pasture, and wildlife habitat.

Representative profile of Glendale clay loam, about 0.8 mile east of Peralta; at south edge of field and 215 feet west of farm road culvert:

Ap—0 to 7 inches, brown (7.5YR 5/2, 7.5YR 4/2 moist) clay loam; moderate, medium, subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots; few very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); abrupt boundary. 6 to 12 inches thick.

C1—7 to 14 inches, pinkish-gray (7.5YR 6/2) clay loam, brown (7.5YR 4/2) moist; moderate, medium, subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); gradual boundary, 5 to 10 inches thick.

C2—14 to 32 inches, pinkish-gray (7.5YR 6/2) clay loam, brown (7.5YR 4/2) moist; weak, medium, subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores; few soft masses of lime; moderately calcareous, strongly alkaline (pH 8.5); gradual boundary. 10 to 25 inches thick.

C3—32 to 45 inches, brown (7.5YR 5/2, 7.5YR 4/2 moist) light clay loam; few, fine, distinct, yellowish-red (5YR 5/6) mottles; massive; very hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; moderately calcareous, strongly alkaline (pH 8.7); gradual boundary. 6 to 15 inches thick.

C4—45 to 60 inches, pinkish-gray (7.5YR 7/2, 7.5YR 6/2 moist) loam; common, fine, distinct, reddish-yellow (7.5YR 6/8) mottles; massive; very hard, friable, slightly sticky and slightly plastic; few very fine roots to no roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4).

The A horizon is pinkish gray, light brown, pale brown, or brown. It is clay loam or silty clay loam in texture. The C horizon is pink, pinkish gray, light brown, very pale brown, pale brown, or brown. The texture of the C horizon is heavy silt loam, loam, clay loam, or silty clay loam; clay makes up 25 to 35 percent of the horizon. Thinly stratified layers are common in the C horizon.

Glendale clay loam (0 to 1 percent slopes) (Gs).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Gila and Armijo soils.

Runoff is slow, and the hazard of erosion is slight. In some places permeability is slow.

This Glendale soil is used for irrigated alfalfa, small grains, row crops, permanent pasture, and wildlife habitat. Small tracts are idle. Capability unit I–2, irrigated; wildlife habitat group A.

Glendale loam (0 to 1 percent slopes) (Go).—This level and nearly level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is light-brown loam about 10 inches thick.

Included with this soil in mapping are areas of Gila and Belen soils. Also included are areas of Glendale loam, moderately alkali.

Runoff is slow, and the hazard of soil erosion is slight.

This Glendale soil is used primarily for irrigated alfalfa, small grains, sorghums, permanent pasture, and wildlife habitat. Small tracts are used for community development and unimproved native pasture. Capability unit I–1, irrigated; wildlife habitat group A.

Glendale loam, strongly alkali (0 to 1 percent slopes) (Gr).—This level soil is in the Rio Grande valley. In most places it has rough microrelief. The profile is similar to the one described as representative of the series, but in about 50 percent of the acreage the surface layer is strongly alkaline to very strongly alkaline and has more than 15 percent exchangeable sodium. In addition, the surface layer is loam, sandy clay loam, or heavy fine sandy loam. The soil material is dispersed and crusts easily. The available water capacity is 5 to 7 inches.

Included with this soil in mapping are areas of Gila and Armijo soils. Also included are areas of Glendale soils that have a loamy fine sand surface layer and are strongly alkali.

Runoff is slow, and the hazard of erosion is slight.

Many tracts of this Glendale soil are idle or are used for unimproved native pasture and wildlife habitat. Small tracts are used for irrigated alfalfa, small grains, and permanent pasture. Crop failure is common. Capability unit IVs–4, irrigated; wildlife habitat group A.

Glendale soils, slightly saline (0 to 1 percent slopes) (Gt).—This mapping unit is in the irrigated Rio Grande valley. The soils are level. They have a profile similar to the one described as representative of the series, but the soil has more than 0.18 percent soluble salts and has a seasonal water table at a depth of 50 inches. White crusts of salts are common on the surface. The available water capacity is 5 to 7 inches. In places a loamy substratum begins below depths of about 30 inches. In about 50 percent of the acreage, the surface layer is clay loam, and in about 40 percent, the surface layer is loam.

Included in mapping are areas of Gila and Belen soils. Also included are areas of Glendale loam that are moderately alkali. The included areas make up about 10 percent of the acreage.

Runoff is slow, and the hazard of erosion is slight.

These Glendale soils are used primarily for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. Some areas are used for unimproved native pasture. Capability unit IIs–3, irrigated; wildlife habitat group A.

Gullied Land

Gullied land (GV) (fig. 11) occurs mainly along the Rio Puerco in the western part of the survey area. It consists of unconsolidated, stratified, medium-textured to fine-textured recent alluvium that has been washed mainly from soils of the Armijo, Tome, and Largo series. The areas are dissected by gullies about 10 to 50 feet deep. The slopes are complex. In areas along the margins of the mapping unit, slopes are as little as 1 percent, but the sides of some of the gullies are vertical.

Most areas of Gullied land were surveyed at low intensity. Two small tracts, however, are intermingled with soils that were surveyed at high intensity. One of these tracts is in the south-central part of the survey area east of the Rio Grande and along the Socorro County line. The other tract is on the edge of the Rio Grande valley east of Tome.

Included in the areas mapped are stream channel and areas of riverwash in streambeds. Also included are miniature colluvial slopes at the foot of vertical gully cuts.

Areas of Gullied land are not arable. Most areas are barren of vegetation except for some annuals. Annuals, some grasses, and shrubs grow on the colluvial slopes and along the stream channel.

Runoff is rapid to very rapid, and the hazard of water erosion is severe.

Gullied land is used for watershed. It is a source of silty sedimentation. Pools of water along the stream channel provide water for livestock and wildlife. Dryland capability subclass VIIIe.

Hassell Series

The Hassell series consists of well-drained soils on pediments below red-bed formations. These soils formed

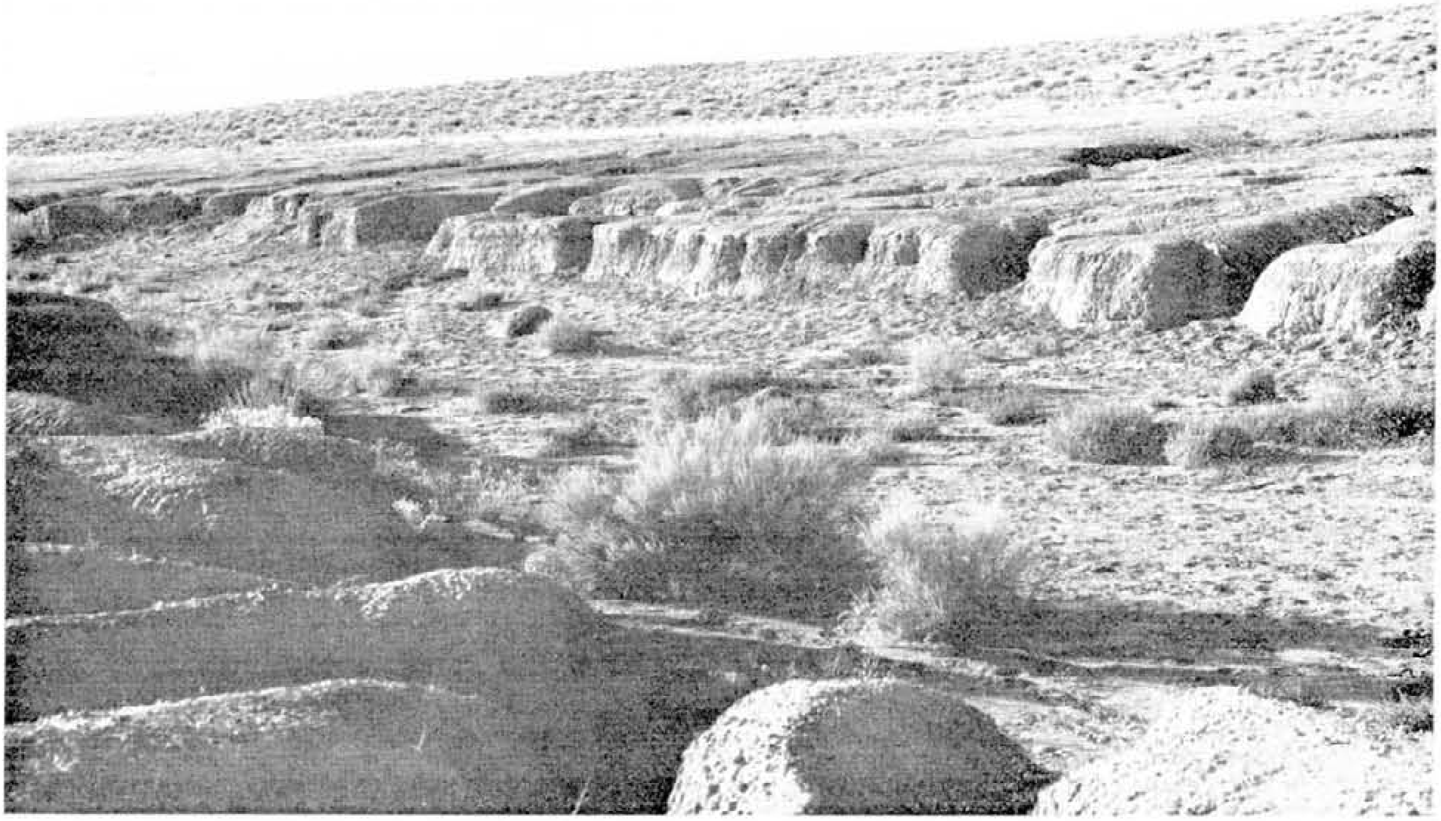

Figure 11.—An area of Gullied land on an alluvial fan east of the Rio Grande. Vegetation grows only in the areas between the gullies.

in residuum weathered from fine textured shale mixed with moderately fine textured alluvial sediment. The vegetation is principally short and mid grasses. Slopes are 2 to 5 percent. Soils of the Hassell series are associated with soils of the Largo series.

Elevations range from 5,800 to 6,100 feet. The average annual air temperature is 55° to 57° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is reddish-brown, calcareous heavy loam about 4 inches thick. The subsoil is reddish-brown, calcareous heavy clay about 23 inches thick. The substratum is reddish-brown, calcareous clay loam underlain by weathered shale at a depth of 35 inches and by sandstone bedrock at a depth of 53 inches.

Permeability is slow. The available water capacity is 4 to 7 inches. The effective rooting depth is 20 to 40 inches.

Hassell soils are used as range, watershed, and wildlife habitat.

Representative profile of Hassell loam, 2 to 5 percent slopes, about 0.2 mile west of the Torrance County line and 0.3 mile north of the Socorro County line; NW¼ SE¼ sec. 33, T. 3 N., R. 5 E.:

A1—0 to 4 inches, reddish-brown (2.5YR 5/4, 2.5YR 4/4) heavy loam; weak, medium, granular structure; hard, friable, sticky and slightly plastic; many very fine roots; many very fine interstitial pores and few very fine tubular pores; moderately calcareous, strongly alkaline (pH 9.0); clear boundary. 2 to 5 inches thick.

B21t—4 to 16 inches, reddish-brown (2.5YR 4/4) heavy clay loam, dark reddish brown (5YR 3/4) moist; moderate, medium, subangular blocky structure parting to strong, fine, subangular blocky; very hard, firm, sticky and plastic; many very fine roots; common very fine tubular pores; few thin clay films on fine pebbles and in pores; few fine pebbles; moderately calcareous, strongly alkaline (pH 8.8); gradual boundary. 10 to 14 inches thick.

B22tca—16 to 21 inches, reddish-brown (2.5YR 4/4, 5YR 4/4 moist); heavy clay loam; moderate, medium, subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; few thin clay films in pores; few fine soft masses of lime; moderately calcareous, strongly alkaline (pH 8.9); gradual boundary. 0 to 6 inches thick.

B3ca—21 to 27 inches, reddish-brown (2.5YR 5/4, 2.5YR 4/4 moist) heavy clay loam; moderate, fine and medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; common fine soft masses of lime; strongly calcareous, very strongly alkaline (pH 9.1); clear boundary. 5 to 7 inches thick.

C1ca—27 to 35 inches, reddish-brown (2.5YR 5/4, 2.5YR 4/4 moist) clay loam; weak, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; stone line at the base of horizon; pebbles at base of horizon have lime coatings on bottom; common soft masses of lime; strongly calcareous, very strongly alkaline (pH 9.1); clear boundary. 3 to 8 inches thick.

C2ca—35 to 53 inches, weak-red (2.5YR 5/2, 2.5YR 4/2 moist), clayey, weathered shale; massive with lenses of weak, thin, platy structure; hard, friable, slightly sticky and slightly plastic; no roots; few very fine tubular pores; common soft masses of lime; strongly calcareous, very strongly alkaline (pH 9.1); abrupt boundary. 15 to 30 inches thick.

IIR—53 inches, weak-red (2.5YR 4/2) sandstone, dusky red (2.5YR 3/2) moist.

The A horizon is reddish brown or light reddish brown. Its texture ranges from loam to light clay loam. The B horizon is reddish brown or light reddish brown. The texture of the B horizon ranges from heavy clay loam to heavy silty clay loam. The C horizon is reddish brown, light reddish brown, pinkish gray, or weak red. The depth to weathered shale ranges from 20 to 40 inches.

Hassell loam, 2 to 5 percent slopes (HA).—This nearly level to gently sloping soil is on upland pediments in the southeastern part of the survey area. It was surveyed at low intensity.

Included with this soil in mapping are areas of soils that are 8 to 20 inches deep to sandstone bedrock. Also included are areas of sandstone outcrops and areas of Largo soils. In addition, small areas are included along the boundary with Torrance County of stony steep land and of soils mapped in the Torrance Area as Scholle and Moriarty soils.

Runoff is medium, and the hazard of water erosion is moderate.

This Hassell soil is used as range, watershed, and wildlife habitat. Dryland capability subclass VIe; Loamy CP range site; wildlife habitat group H.

Ildefonso Series

The Ildefonso series consists of well-drained soils on alluvial fans. These soils formed in gravelly, stratified, calcareous, moderately coarse textured alluvium. The vegetation is principally short and mid grasses, shrubs, and juniper. Slopes are 10 to 20 percent. Soils of the Ildefonso series are associated with soils of the Sedillo and Salas series.

Elevations range from 6,000 to 6,400 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is grayish-brown, calcareous stony sandy loam about 5 inches thick. The next layer is light brownish-gray, calcareous very gravelly sandy loam about 7 inches thick. Below this is white very gravelly sandy loam high in lime content, light-gray, calcareous very cobbly sandy loam, and pale-brown, calcareous gravelly sandy loam to a depth of 60 inches or more.

Permeability is moderately rapid. The available water capacity is 3.5 to 5 inches. The effective rooting depth is about 60 inches.

Ildefonso soils are used as range, wildlife habitat, and watershed.

Representative profile of Ildefonso stony sandy loam, 10 to 20 percent slopes, about 0.25 mile west of Torrance County line and 2.3 miles south of Isleta Indian Reservation; SE¼NE¼ sec. 1, T. 6 N., R. 4 E.

A1—0 to 5 inches, grayish-brown (10YR 5/2) stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and few fine roots; common very fine interstitial pores; 25 percent gravel; 5 percent surface cover of stones; disseminated lime; moderately calcareous, moderately alkaline (pH 8.3); clear boundary. 4 to 6 inches thick.

ACca—5 to 12 inches, light brownish-gray (10YR 6/2) very gravelly sandy loam, brown (10YR 4/3) moist; weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots and few fine roots; common very fine interstitial pores; 35 percent gravel; thin coatings of lime on bottom of gravel; moderately calcareous, moderately alkaline (pH 8.4); abrupt boundary. 5 to 8 inches thick.

C1ca—12 to 27 inches, white (10YR 8/2) very gravelly sandy loam, very pale brown (10YR 7/3) moist; massive; very hard, very firm, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; 35 percent gravel; gravel is weakly cemented with lime; strongly calcareous, strongly alkaline (pH 8.5); gradual boundary. 12 to 18 inches thick.

C2ca—27 to 47 inches, light-gray (10YR 7/2) very cobbly sandy loam, pale brown (10YR 6/3) moist; massive; hard, friable, nonsticky and nonplastic; common very fine roots and few fine roots; few very fine tubular pores; 50 percent coarse fragments; horizon contains weathered granite cobblestone surrounded by noncalcareous light-brown (7.5YR 6/4) sandy loam; matrix is lime impregnated; strongly calcareous, strongly alkaline (pH 8.6); clear boundary. 0 to 30 inches thick.

C3—47 to 60 inches, pale-brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common fine interstitial pores; 25 percent gravel; thin coatings of lime on bottom of gravel; moderately calcareous, moderately alkaline (pH 8.2).

The A horizon is light brownish gray or pale brown in color and ranges from gravelly sandy loam to very stony sandy loam in texture. Coarse fragments make up 25 to 45 percent of the A horizon. The AC horizon is light brownish gray, pale brown, or brown in color and ranges from very gravelly sandy loam to very cobbly sandy loam in texture. Coarse fragments make up 35 to 50 percent of the AC horizon. The Cca horizon is white, very pale brown, or light gray in color and ranges from very gravelly sandy loam to very cobbly sandy loam in texture. Coarse fragments make up 35 to 65 percent of the Cca horizon. The C3 horizon is pale brown or light yellowish brown in color and ranges from gravelly sandy loam to very gravelly sandy loam in texture. Coarse fragments make up 20 to 45 percent of the C3 horizon.

Ildefonso stony sandy loam, 10 to 20 percent slopes (ID).—This rolling to hilly soil is on foot slopes of the Manzano Mountains. It was surveyed at low intensity.

Included with this soil in mapping are areas of Sedillo soils and areas of cobbly alluvial soils. Also included, along the Torrance County line, are small areas of Salas soils.

Runoff is medium, and the hazard of water erosion is severe.

This Ildefonso soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIs; Gravelly WP range site; wildlife habitat group L.

Laporte Series

The Laporte series consists of well-drained soils on hills. These soils formed in residuum weathered from limestone. The vegetation is principally mid grasses, shrubs, one-seed juniper, and pinyon pine. Slopes are 15 to 50 percent. Soils of the Laporte series are associated with soils of the Deama and Pinon series.

Elveations range from 6,000 to 7,000 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is dark grayish-brown, calcareous gravelly loam about 7 inches thick. The next layer is brown, calcareous gravelly loam about 4 inches thick. This layer is underlain by limestone bedrock at a depth of about 11 inches.

Permeability is moderate. The available water capacity is 1 to 2.5 inches. The effective rooting depth is 7 to 17 inches.

Laporte soils are used as range, wildlife habitat, and watershed. In this survey area they are mapped only in an association with Deama soils.

Representative profile of Laporte gravelly loam, from an area of Deama-Laporte association, steep, 30 feet west of the boundary with the Cibola National Forest and 2.3 miles north of the Socorro County line; NW¼ NW¼ sec. 19, T. 3 N., R. 5 E.:

A1—0 to 7 inches, dark grayish-brown (10YR 4/2) gravelly loam, dark brown (10YR 3/3) moist; moderate, fine, granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; common fine interstitial pores; approximately 30 percent gravel; moderately calcareous, moderately alkaline (pH 8.0); clear boundary. 5 to 9 inches thick.

Cca—7 to 11 inches, brown (10YR 5/3) gravelly loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure that parts to weak, fine, granular; slightly hard, friable, nonsticky and nonplastic; many very fine roots and few medium roots; many fine tubular pores; approximately 30 percent gravel; thin coatings of lime on gravel and few soft masses of lime; strongly calcareous, moderately alkaline (pH 8.3); clear boundary. 2 to 8 inches thick.

R—11 inches, white (10YR 8/1), lime-coated, fractured limestone bedrock, pale brown (10YR 6/3) moist; few very fine roots in fractures; fractures filled with soft lime.

The A horizon is dark grayish brown, grayish brown, or brown in color and ranges from gravelly loam to stony loam in texture. Coarse fragments make up 15 to 35 percent of the A horizon. The C horizon is light brownish gray, pale brown, or brown in color and ranges from gravelly loam to cobbly loam in texture. Coarse fragments make up 20 to 35 percent of the C horizon. The depth to bedrock ranges from 7 to 17 inches.

Largo Series

The Largo series consists of well-drained soils on alluvial fans and terraces. These soils formed in recent alluvium derived manly from red-bed siltstone and shale. The vegetation is principally short and mid grasses and shrubs. Slopes are 0 to 3 percent. Soils of the Largo series are associated with soils of the Pajarito and Wink series.

Elevations range from 4,800 to 5,900 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 12 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is reddish-brown silty clay loam about 12 inches thick. The next layers are light reddish-brown and reddish-brown silty clay loam to a depth of 60 inches or more. The soil is calcareous throughout.

Permeability is moderately slow. The available water capacity is 11 to 12.5 inches. The effective rooting depth is 60 inches or more.

Largo soils are used for irrigated row crops and hay, range, wildlife habitat, and watershed.

Representative profile of Largo silty clay loam, about 3 miles south of Casa Colorada School; 1.45 miles east of New Mexico State Highway 47, and 900 feet north of the Socorro County line:

Ap—0 to 12 inches, reddish-brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak, medium, subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.0); abrupt boundary. 8 to 14 inches thick.

C1—12 to 16 inches, reddish-brown (5YR 5/4, 5YR 4/4 moist) silty clay loam; weak, thick, platy structure that parts to weak, fine, subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); clear boundary. 0 to 10 inches thick.

C2—16 to 24 inches, light reddish-brown (2.5YR 6/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak, fine and medium, subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); clear boundary. 6 to 18 inches thick.

C3—24 to 60 inches, reddish-brown (5YR 5/3, 5YR 4/3 moist) silty clay loam; massive; hard, friable, sticky and plastic; no roots; common very fine tubular pores; few, fine, distinct threads of salts and lime; moderately calcareous, moderately alkaline (pH 8.0).

The A horizon is reddish brown or light reddish brown in color and ranges from silty clay loam to clay loam in texture. The C horizon is reddish brown, light reddish brown, or light brown in color and ranges from silty clay loam to heavy silt loam or loam that is 25 to 35 percent clay. Thin strata of very fine sandy loam or fine sandy loam occur below depths of about 30 inches in places. The content of salts and lime ranges from none to common fine threads.

Largo loam (1 to 3 percent slopes) (La).—This nearly level soil is on terraces and alluvial fans east of the Rio Grande, along the Socorro County line. It has a profile similar to the one described as representative of the series, but the surface layer is light-brown to reddish-brown loam or very fine sandy loam about 8 inches thick.

Included with this soil in mapping are areas of soils that have a surface layer of brown silty clay loam. The included areas are east of Tome.

Runoff is medium, and the hazard of water erosion is moderate.

This Largo soil is used for range, irrigated vegetables and hay, wildlife habitat, and watershed. Capability unit

IIe-3, irrigated; dryland capability subclass VIIe; Salt Flats SD range site; wildlife habitat group B.

Largo loam (1 to 3 percent slopes) (LG).—This nearly level soil is on alluvial fans. The areas join soils that were mapped as Moriarty clay loam, 2 to 6 percent slopes, in the soil survey of the Torrance Area. The profile is similar to the one described as representative of the series, but the surface layer is reddish-brown loam about 10 inches thick. The soil was mapped at low intensity.

Included with this soil in mapping are areas of Sedillo soils. Also included are areas of soils that have a surface layer of reddish-brown silty clay loam; clay makes up 35 to 38 percent of these soils. The included soils make up about 15 percent of the acreage.

Runoff is medium, and the hazard of water erosion is moderate. Dryland capability subclass VIIe; Salt Flats SD range site; wildlife habitat group H.

Largo silty clay loam (0 to 1 percent slopes) (Lr).—This level soil is on terraces east of the Rio Grande, along the Socorro County line. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Largo loam and a few small areas of Pajarito soils.

Runoff is slow, and the hazard of erosion is slight.

This Largo soil is used for irrigated vegetables and hay, range, wildlife habitat, and watershed. Capability unit I-2, irrigated; dryland capability subclass VIIc; Salt Flats SD range site; wildlife habitat group A.

Latene Series

The Latene series consists of well-drained soils on alluvial fans. These soils formed in mixed old alluvium. They are high in lime content. The vegetation is principally short and mid grasses, shrubs, and annuals. Slopes are 1 to 10 percent. Soils of the Latene series are associated with soils of the Madurez, Wink, and Nickel series.

Elevations range from 4,900 to 5,600 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is light-brown loam about 11 inches thick. The next layer is pink gravelly loam about 26 inches thick. This layer has a high content of lime. Below this is pink gravelly sandy loam that contains less gravel and lime than the horizon above. This material extends to a depth of 60 inches.

Permeability is moderate. The available water capacity is 6.5 to 7.5 inches. The effective rooting depth is 40 to 60 inches.

Latene soils are used as range, watershed, wildlife habitat, and community development.

Representative profile of Latene loam, 20 feet northwest of ranch road, 1.6 miles northeast of New Mexico Highway 6; 12 miles southeast of intersection of New Mexico Highway 6 and 47:

A1—0 to 11 inches, light-brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; massive; soft, friable, nonsticky and nonplastic; many fine roots; common fine interstitial pores and tubular pores; strongly calcareous, moderately alkaline (pH 8.2); clear boundary. 9 to 13 inches thick.

C1ca—11 to 37 inches, pink (7.5YR 8/4, 7.5YR 7/4 moist) gravelly loam; massive; very hard, very firm, nonsticky and nonplastic; few fine roots; few fine tubular pores; 25 percent caliche gravel; strongly calcareous, moderately alkaline (pH 8.4); gradual boundary. 20 to 30 inches thick.

C2ca—37 to 60 inches, pink (7.5YR 7/4) gravelly sandy loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; common fine interstitial pores; 15 percent caliche gravel; strongly calcareous, strongly alkaline (pH 8.7).

The A horizon is light brown or brown in color and fine sandy loam and loam in texture. The C1ca horizon is very pale brown, pink, or white in color and gravelly sandy loam or gravelly loam to texture. Caliche gravel makes up 15 to 30 percent of the C1ca horizon. The C2ca horizon is pink or white gravelly sandy loam or loam and is 10 to 20 percent caliche gravel.

Latene loam (1 to 5 percent slopes) (LV).—This nearly level to gently sloping soil is on old alluvial fans. It has the profile described as representative of the series. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of Wink, Tres Hermanos, and Caliza soils, as well as areas of Latene loamy fine sand. These areas make up 15 percent of the acreage. Also included are areas of Latene loam (5 to 9 percent slopes), which make up 25 percent of the acreage. Areas of similar soils that are darker colored are along the base of the Manzano Mountains.

Runoff is medium, and the hazard of erosion is moderate.

This Latene soil is used for range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Latene loamy fine sand (1 to 5 percent slopes) (LS).—This gently undulating to undulating soil is in the eastern part of the survey area. It has a profile similar to the one described as representative of the series, but the surface layer is loamy fine sand. The soil was surveyed at low intensity.

Runoff is slow. The hazard of soil blowing is severe.

Included with this soil in mapping are areas of Latene loam and areas of Wink and Madurez soils.

This Latene soil is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Madurez Series

The Madurez series consists of well-drained soils on the piedmont. These soils formed in old unconsolidated alluvium that has been modified by wind. The vegetation is principally short and mid grasses and shrubs. Slopes are 0 to 5 percent. Soils of the Madurez series are associated with soils of the Bluepoint, Tres Hermanos, and Wink series.

Elevations range from 4,900 to 5,600 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile (fig. 12) the surface layer is light-brown loamy fine sand about 10 inches thick. The subsoil is brown light sandy clay loam about 12 inches thick. The substratum is pink loam and sandy

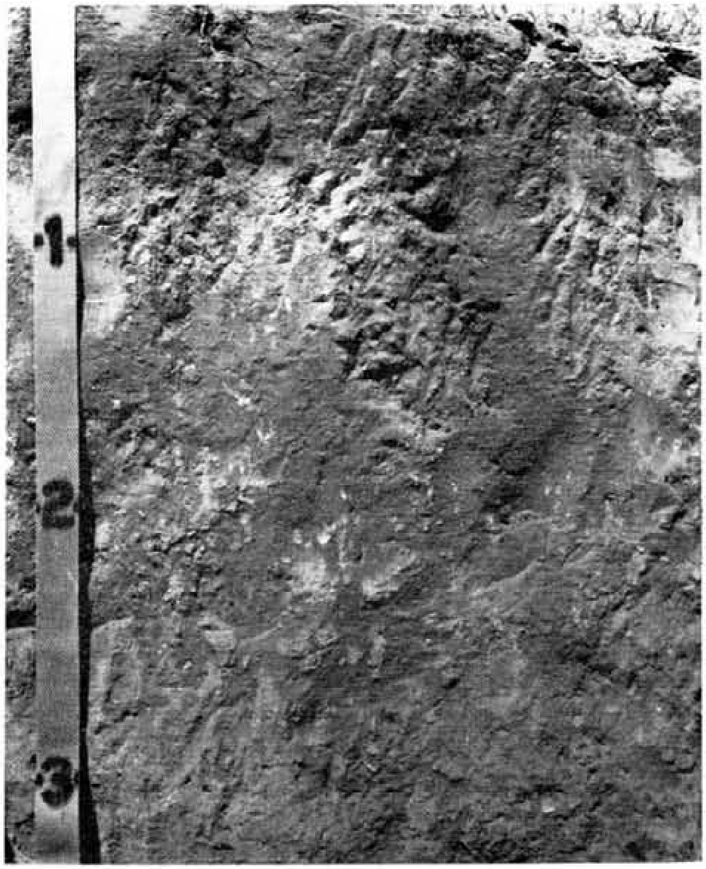

Figure 12.—**Profile of Madurez loamy fine sand.**

loam that has a high content of lime. The substratum extends to depths of 60 inches or more.

Permeability is moderate. The available water capacity is 7.5 to 9 inches. The effective rooting depth is 60 inches or more.

Madurez soils are used as range, watershed, and wildlife habitat. Many tracts have been subdivided into building lots.

Representative profile of Madurez loamy fine sand, about 7 miles southeast of Belen; 4,050 feet southwest of New Mexico Highway 6; 3,050 feet west of gravel road and 35 feet south of subdivision road in Unit G of Rio Grande Estates:

A1—0 to 10 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; many fine roots; common fine interstitial pores; noncalcareous, moderately alkaline (pH 8.2); clear boundary. 3 to 12 inches thick.

B2t—10 to 16 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) light sandy clay loam; moderate, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common very fine tubular pores; colloid stains on sand grains and few thin clay films in pores; noncalcareous, moderately alkaline (pH 8.2); clear boundary. 4 to 8 inches thick.

B3tca—16 to 22 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) light sandy clay loam; moderate, coarse, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common very fine tubular pores; colloid stains on sand grains and few thin clay films in pores; few threads of lime; slightly calcareous, moderately alkaline (pH 8.4); abrupt boundary. 4 to 12 inches thick.

C1ca—22 to 46 inches, pink (7.5YR 7/4) loam, light brown (7.5YR 6/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; many pinkish-white (7.5YR 8/2) masses of lime; strongly calcareous, moderately alkaline (pH 8.4); gradual boundary. 10 to 30 inches thick.

C2ca—46 to 60 inches, pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; very hard, firm, nonsticky and nonplastic; no roots; few very fine tubular pores; common masses of lime decreasing with depth; strongly calcareous, moderately alkaline (pH 8.4).

The A horizon is light brown, pale brown, or brown in color and ranges from loamy fine sand or loamy sand to fine sandy loam in texture. It is massive or single grained or has weak, subangular blocky structure. The B2t and B3tca horizons are brown, reddish brown, or strong brown in color, and their texture ranges from heavy fine sandy loam to sandy clay loam that is 18 to 28 percent clay. The structure of these horizons ranges from weak, medium, or moderate, coarse, subangular blocky structure to weak, medium, prismatic structure. Segregated lime ranges from a few soft masses to few or common threads in the B3ca horizon.

The Cca horizon is light brown, pink, pinkish white, or very pale brown in color and ranges from sandy loam to loam in texture. Segregated lime ranges from many threads and common soft masses to many soft masses. The calcium carbonate equivalent ranges from 15 to 25 percent in the upper part of the Cca horizon, but commonly ranges from 10 to 18 percent in the lower part.

In mapping units, Ma, Md, ME, and MH, the soil in about 25 percent of the acreage has a C1ca horizon that contains less lime (8 to 15 percent calcium carbonate equivalent) than is defined in the range for the series. This difference, however, does not alter the usefulness or behavior of the soils.

Madurez fine sandy loam (1 to 5 percent slopes) (Mf).—This nearly level to gently sloping soil is on piedmont uplands east of the Rio Grande. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam about 3 inches thick.

Included with this soil in mapping are areas of Wink and Tres Hermanos soils and areas of Madurez loamy fine sand.

Runoff is medium. The hazard of soil blowing is moderate.

This Madurez soil is used for range, watershed, community development, and wildlife habitat. The vegetation is mainly short and mid grasses. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Madurez loamy fine sand (1 to 5 percent slopes) (Md).—This gently undulating and undulating soil is on the piedmont uplands east of the Rio Grande. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Madurez loamy sand, hummocky; Madurez fine sandy loam; and Wink soils. The included soils make up about 10 percent of the acreage.

Runoff is slow. The hazard of soil blowing is severe.

This Madurez soil is used for range, wildlife habitat, community development, and watershed. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Madurez loamy fine sand (1 to 5 percent slopes) (ME).—This gently undulating to undulating soil is on piedmont uplands. It has a profile similar to the one described as representative of the series, but the surface layer is loamy fine sand, about 5 inches thick, and the subsoil is reddish-brown sandy clay loam. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of Tres Hermanos and Wink soils and areas of Madurez fine sandy loam.

Runoff is slow. The hazard of soil blowing is severe.

This Madurez soil is used as range, wildlife habitat, community development, and watershed. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Madurez loamy sand, hummocky (Ma).—This undulating soil is on piedmont uplands east of the Rio Grande. It has a profile similar to the one described as representative of the series, but the surface layer is loamy sand about 12 inches thick. Winnowing has removed fine particles. The soil is hummocky, and the hummocks are 1 to 2 feet high.

Included with this soil in mapping are areas of Madurez loamy fine sand and areas of Wink and Bluepoint soils.

Runoff is slow. The hazard of soil blowing is severe.

This Madurez soil is used as range, wildlife habitat, community development, and watershed. The vegetation is mainly mid and tall grasses and shrubs. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group E.

Madurez-Bluepoint association, hummocky (MH).—This association consists of about 45 percent Madurez loamy sand that has 1 to 5 percent slopes, and 45 percent Bluepoint loamy sand that has 1 to 9 percent slopes. It is in the eastern and central parts of the survey area. The soils were surveyed at low intensity.

The Madurez soil in this association is gently undulating to undulating and is hummocky. The hummocks are 1 to 2 feet high. The profile of this soil is similar to the one described as representative of the Madurez series, but winnowing has removed fine particles and the texture of the surface layer is loamy sand. The vegetation is mainly mid and tall grasses and shrubs.

The Bluepoint soil in this association is gently undulating to gently rolling and is more hummocky than the Madurez soil. The hummocks are 2 to 5 feet high. The profile of this soil is similar to the one described as representative of the Bluepoint series, but the surface layer is loamy sand about 5 inches thick. A buried soil occurs below depths of 3 feet in most places.

Included in the areas mapped are areas of Wink soils. The included soils make up about 10 percent of the acreage.

Runoff is slow. The hazard of soil blowing is severe.

This association is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIe; Deep Sand SD range site; the Madurez soil is in wildlife habitat group E; the Bluepoint soil is in wildlife habitat group D.

Madurez-Wink association, undulating (MK).—This association is on piedmont fans throughout much of the survey area. It consists of about 65 percent Madurez loamy fine sand that has 1 to 5 percent slopes, and 25 percent Wink loamy fine sand that has 3 to 5 percent slopes. The soils were surveyed at low intensity.

The Madurez soil in this association is mainly gently undulating. It occurs on slightly convex piedmont fans. The profile is similar to the one described as representative of the Madurez series, but the surface layer is loamy fine sand about 5 inches thick.

The Wink soil in this association is gently undulating to undulating. It occurs on the sides of low ridges. The profile is similar to the one described as representative of the series, but the surface layer is loamy fine sand about 6 inches thick.

Included in the areas mapped are areas of Bluepoint and Latene soils. The included soils make up about 10 percent of the acreage.

Runoff is slow. The hazard of soil blowing is severe.

This association is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Millett Series

The Millett series consists of well-drained soils on alluvial fans. These soils formed principally in granitic alluvium. The vegetation is principally mid grasses and shrubs. Slopes are 1 to 9 percent. Soils of the Millett series are associated with soils of the Tesajo, Sedillo, and Tres Hermanos series.

Elevations range from 5,500 to 6,400 feet. The average annual air temperature is 51° to 54° F., and the average annual precipitation is 9 to 12 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is brown loam about 4 inches thick. The subsoil is brown gravelly sandy clay loam and gravelly loam about 12 inches thick. The substratum is pink very gravelly sandy loam that has soft masses and threads of lime. The substratum extends to depths of 60 inches or more.

Permeability is moderate. The available water capacity is 4 to 5.5 inches. The effective rooting depth is 60 inches or more.

Millett soils are used as range, wildlife habitat, and watershed.

Representative profile of Millett loam, from an area of Millett-Tesajo association, sloping, 0.85 mile due southeast of a point 0.3 mile west of corral in SE¼SW¼ sec. 15, T. 3 N., R. 4 E.; 0.7 mile north of A.T. & S.F. Railroad, and 0.75 mile east of dike:

A1—0 to 4 inches, brown (10YR 5/3) loam, dark brown (7.5YR 4/3) moist, weak, fine, subanglar blocky structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine tubular pores and interstitial pores; 10 percent fine gravel; noncalcareous, moderately alkaline (pH 8.2); clear boundary. 2 to 6 inches thick.

B2t—4 to 9 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) gravelly sandy clay loam; weak, fine, subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine and very fine tubular pores; 30 percent fine gravel; noncalcareous, moderately alkaline (pH 8.0); clear boundary. 3 to 7 inches thick.

B3ca—9 to 16 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) gravelly loam; weak, fine, subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; 30 percent fine gravel; thin coatings of lime on bottom of pebbles; slightly calcareous, moderately alkaline (pH 8.3); clear boundary. 5 to 10 inches thick.

IICca—16 to 60 inches, pink (7.5YR 7/3) very gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; soft, friable, nonsticky and nonplastic; few fine roots; many very fine and common fine tubular pores; 50 percent fine gravel; 20 to 30 percent soft masses and threads of lime; strongly calcareous, strongly alkaline (pH 8.8).

The A horizon is dark brown, brown, or grayish brown. Its texture ranges from sandy loam or gravelly sandy loam to loam or gravelly loam that is 10 to 30 percent gravel. The B2t horizon is brown or reddish brown in color and ranges from gravelly loam to gravelly sandy clay loam in texture. The B3ca horizon is brown or light brown in color and ranges from gravelly loam to gravelly sandy clay loam that has few to many fine threads of lime. The Cca horizon is pink to pale-brown very gravelly sandy loam that has 35 to 85 percent coarse fragments. Soft masses and threads of lime make up 20 to 30 percent of the Cca horizon.

Millett-Tesajo association, sloping (Ml).—This association consists of about 60 percent Millett loam, 1 to 9 percent slopes, and 30 percent Tesajo gravelly loam, 1 to 9 percent slopes.

The Millett soil in this association is on the lower part of fans. It has the profile described as representative of the Millett series.

The Tesajo soil is on foot slopes of the Manzano Mountains and along the long, narrow arroyos on alluvial fans. It has the profile described as representative of the Tesajo series.

Included in the areas mapped are areas of Sedillo very gravelly loam, which make up about 5 percent of the acreage. Also included are areas of Tres Hermanos loam, Salas soils, and areas of cobbly alluvial soils, which make up about 5 percent of the acreage.

Runoff is medium to slow, and the hazard of water erosion is moderate.

This association is used as range, wildlife habitat, and watershed. Dryland capability subclass VIs; Gravelly WP range site; wildlife habitat group J.

Mixed Alluvial Land

Mixed alluvial land (0 to 3 percent slopes) (Mn) consists of level to nearly level mixed clay, silts, sand, and gravel. The soils are dominantly sandy and have little or no profile development. They formed in recent alluvium. The areas are along the margin of the Rio Grande and are subject to stream overflow. They have a fluctuating water table. Rough microrelief is common.

Permeability is variable. Runoff is slow, and the hazard of erosion is slight to moderate.

Use of this land type is limited to watershed and such recreational uses as hunting of waterfowl and small game, fishing, and picnicking. Mixed alluvial land is also used for unimproved native pasture. The vegetation consists of water-tolerant grasses, shrubs, and trees. Dryland capability subclass VIIw; Salty Bottomland SD range site; wildlife habitat group N.

Nickel Series

The Nickel series consists of well-drained soils on alluvial fans. These soils formed in gravelly alluvium weathered from schist, gneiss, granite, limestone, and quartzite. The vegetation is principally short and mid grasses, half-shrubs, and one-seed juniper. Slopes are 5 to 25 percent. Soils of the Nickel series are associated with soils of the Latene and Tres Hermanos series.

Elevations range from 5,400 to 6,000 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is pale-brown, calcareous gravelly fine sandy loam about 5 inches thick. The underlying layers are pale-brown and white, calcareous gravelly loam, very gravelly loam, and very gravelly sandy loam to a depth of 60 inches or more.

Permeability is moderately slow. The available water capacity is 3 to 4 inches. The effective rooting depth is 20 to 30 inches.

Nickel soils are used as range, watershed, and wildlife habitat. They are a potential source of gravel.

Representative profile of Nickel gravelly fine sandy loam, from an area of Nickel-Latene association, rolling, about 12 miles southeast of Los Lunas; 0.45 mile east of corral and water reservoir, and 30 feet north of trail:

A1—0 to 5 inches, pale-brown (10YR 6/3) gravelly fine sandy loam, brown (10YR 4/3) moist; weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many fine interstitial pores; 30 percent gravel; thin coatings of lime on bottom of pebbles; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 3 to 6 inches thick.

AC—5 to 10 inches, pale-brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many fine interstitial pores and few very fine tubular pores; 30 percent gravel; thin coatings of lime on bottom and sides of pebbles; common soft masses of lime; strongly calcareous, moderately alkaline (pH 8.2); clear boundary. 2 to 10 inches thick.

C1ca—10 to 18 inches, white (10YR 8/2) very gravelly loam, light gray (10YR 7/2) moist; massive; hard, friable, nonsticky and nonplastic; common very fine roots; common very fine tubular pores; 60 percent gravel weakly cemented with lime; strongly calcareous, moderately alkaline (pH 8.4); clear boundary. 6 to 14 inches thick.

C2—18 to 60 inches, very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; common fine interstitial pores; 70 percent gravel; thin coatings of lime on pebbles; lime coatings decrease with depth; moderately calcareous, moderately alkaline (pH 8.4).

The A horizon is light yellowish brown or pale brown in color and ranges from gravelly sandy loam to gravelly loam in texture. Gravel makes up 15 to 35 percent of this horizon. The AC horizon is pale brown or light brown in color and ranges from gravelly loam to gravelly sandy loam in texture. Gravel makes up 15 to 35 percent of the AC horizon. The Cca horizon is white or pinkish white in color and ranges from very gravelly loam to very gravelly sandy loam in texture. Gravel makes up 45 to 75 percent of this horizon. The Cca horizon is weakly to strongly cemented. The C2 horizon is pale brown or very pale brown very gravelly sandy loam. Gravel makes up 50 to 80 percent of this horizon.

Nickel-Latene association, rolling (Nl).—This association consists of about 50 percent Nickel gravelly fine sandy loam, 5 to 25 percent slopes, and 40 percent Latene loam, 1 to 10 percent slopes.

The Nickel soil in this association occurs along the edges and sides of ridges and breaks. It has the profile described as representative of the series.

The Latene soil is nearly level to strongly sloping. It is on the upper part of old alluvial fans. The profile of this soil is similar to the one described as representative of the series, but the soil is light loam throughout the profile, and gravel or cobblestones occur below depths of 18 inches.

Included in the areas mapped are areas of Tres Hermanos, Tome, and Arizo soils. Also included are soils that are similar to Nickel soils that are made up of 25 to 35 percent gravel. The included soils make up about 10 percent of the acreage.

Runoff is rapid, and the hazard of water erosion is severe.

This association is used as range, watershed, and wildlife habitat. The Nickel soil is a potential source of gravel. Dryland capability subclass VIIe: the Nickel soil is in Limy SD range site and wildlife habitat group K; the Latene soil is in Loamy SD range site and wildlife habitat group I.

Pajarito Series

The Pajarito series consists of well-drained soils on alluvial fans below the margins of the piedmont and on alluvial fans on the piedmont. These soils formed in mixed alluvium. The vegetation is principally short and mid grasses, shrubs, and annuals. Slopes are 0 to 5 percent. Soils of the Pajarito series are associated with soils of the Wink, Caliza, and Bluepoint series.

Elevations range from 4,750 to 5,500 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is light-brown loamy fine sand about 13 inches thick. The subsoil is light-brown fine sandy loam about 7 inches thick. The substratum is light-brown fine sandy loam and loam that has few to common threads or soft masses of lime to a depth of 60 inches or more.

Permeability is moderately rapid. The available water capacity is 7 to 8.5 inches. The effective rooting depth is 60 inches or more.

Pajarito soils are used as range, watershed, wildlife habitat, and community development.

Representative profile of Pajarito loamy fine sand, 1 mile south of junction of New Mexico Highways 47 and 6; 440 feet west of road at forks of old trail:

A1—0 to 13 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 5 to 18 inches thick.

B2—13 to 20 inches, light-brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; few fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); gradual boundary. 5 to 15 inches thick.

C1—20 to 52 inches, light-brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; few fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); gradual boundary. 25 to 35 inches thick.

C2—52 to 60 inches, light-brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; soft, very friable, slightly sticky and nonplastic; few threads and small soft masses of lime; strongly calcareous, strongly alkaline (pH 8.6).

The A horizon is light brown and reddish brown. It is single grained or massive, or it has very weak, medium, subangular blocky structure. The B2 horizon is light brown, reddish brown, or brown. It has very weak or weak, medium, subangular blocky structure and is moderately or strongly calcareous. The C horizon is light-brown, reddish-brown, or brown loamy fine sand to loam. It is massive or has weak, medium, subangular blocky structure. Segregated lime ranges from a few fine threads to common soft masses.

Pajarito fine sandy loam (1 to 5 percent slopes) (PH).—This nearly level to gently sloping soil is in the eastern part of the survey area. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam, and lime and gravel make up 5 to 15 percent of the subsoil and upper part of the substratum. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of Wink, Madurez, and Tres Hermanos soils. Also included are areas of Pajarito loamy fine sand.

Runoff is medium. The hazard of erosion is moderate.

This Pajarito soil is used as range, watershed, and wildlife habitat. The vegetation consists mainly of short and mid grasses and annuals. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Pajarito loamy fine sand (1 to 5 percent slopes) (Pa).—This gently undulating to undulating soil is on alluvial fans between the breaks of the piedmont and the Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Bluepoint, Wink, and Madurez soils. Also included are areas of Pajarito fine sandy loam.

Runoff is slow. The hazard of soil blowing is severe.

This Pajarito soil is used as range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Pajarito loamy fine sand, hummocky (Pf).—This undulating soil is on alluvial fans north of the Socorro County line. Hummocks, 2 to 5 feet high, have formed. The profile is similar to the one described as representative of the series, but the surface layer and the subsoil are reddish brown.

Included with this soil in mapping are areas of Bluepoint and Wink soils. Also included are areas of Pajarito fine sandy loam.

Runoff is slow. The hazard of soil blowing is severe.

This Pajarito soil is used as range, wildlife habitat, and watershed. The vegetation consists mainly of shrubs and mid grasses. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group E.

Pinon Series

The Pinon series consists of well-drained soils that formed in material weathered from limestone bedrock. The vegetation is principally mid grasses, shrubs, and one-seed juniper. Slopes are 3 to 10 percent. Soils of the Pinon series are associated with soils of the Dean and Laporte series.

Elevations range from 5,800 to 6,300 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is brown or pale-brown, calcareous loam about 10 inches thick. The next layer is pale-brown, calcareous gravelly loam. Limestone bedrock begins at a depth of about 16 inches.

Permeability is moderately slow. The available water capacity is 2 to 3 inches. The effective rooting depth is 10 to 20 inches.

Pinon soils are used as range, wildlife habitat, and watershed. In this survey area they are mapped only in association with Dean soils.

Representative profile of Pinon loam, from an area of Dean-Pinon association, gently sloping; 0.5 mile west of Cibola National Forest boundary and 1.15 miles north of Socorro County line; SW¼SE¼ sec. 24, T. 3 N., R. 4 E.:

A11—0 to 3 inches, brown (10YR 5/3, 10YR 4/3 moist) loam; weak, fine, granular structure; slightly hard, friable, nonsticky and nonplastic; many fine and very fine roots; common very fine tubular pores; 5 percent gravel; thin coatings of lime on pebbles; strongly calcareous, moderately alkaline (pH 8.4); clear boundary. 0 to 5 inches thick.

A12—3 to 10 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak, fine, subangular blocky structure; hard, friable, slightly sticky and nonplastic; many very fine roots; few fine tubular pores and many very fine tubular pores; 5 percent gravel; thin coatings of lime on pebbles; few soft masses of lime; strongly calcareous, moderately alkaline (pH 8.3); clear boundary. 5 to 8 inches thick.

Cca—10 to 16 inches, pale-brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few fine tubular pores and many very fine tubular pores; approximately 30 percent of horizon is lime-coated limestone gravel; thick coatings of lime on pebbles; many small concretions of lime; strongly calcareous, moderately alkaline (pH 8.4); abrupt boundary. 5 to 7 inches thick.

R—16 inches, limestone bedrock that has thick coatings of lime on the upper surface.

The A horizon is brown, light brown, or pale brown. The Cca, horizon is pale brown, very pale brown, light gray, or pinkish gray. The texture of the Cca horizon ranges from gravelly loam to cobbly loam. Coarse fragments make up 15 to 35 percent of the Cca horizon. The depth to bedrock ranges from 10 to 20 inches.

Riverwash

Riverwash (Rv) consists of level and nearly level areas of unconsolidated recent alluvium along the Rio Grande. The soil material is mainly stratified fine sand to coarse sand that contains pockets of gravel. A soil profile has not developed, but in places the sediment is mottled because of a high water table. The areas are subject to shifting by frequent stream overflow and to soil blowing when they are not under water.

Included in the areas mapped are areas of Mixed alluvial land and areas of the Rio Grande channel.

Permeability is variable. The hazard of water erosion is severe.

Use of this land type is limited. It is used as watershed and a source of irrigation water. The areas are also used for such recreational purposes as hunting small game and game birds, especially waterfowl, and limited fishing. Dryland capability subclass VIIIw.

Rock Land

Rock land (RW) consists of mesa breaks, canyon walls, and sides of ridges in the Manzano Mountains and on Mesa Carrizo. Slopes are 30 to 80 percent. About 55 percent of the acreage consists of rock outcrops, and about 30 percent is very shallow, rocky soils. The areas were surveyed at low intensity.

The rock outcrops are in areas where resistant sandstone or limestone has been exposed through faulting, uplifting, or stream channel erosion. The soils are between the rock outcrops. They are mainly dark colored, calcareous, and loamy and are steep to very steep. Coarse fragments make up about 50 percent of the soil mass.

Elevations range from 6,000 to 7,800 feet. The average annual air temperature is 48° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 130 to 170 days.

Included in the areas mapped are areas of Santa Fe soils and areas of very gravelly or stony, colluvial and alluvial soils at the base of slopes. Also included, along the boundary with Torrance County, are small areas of soils mapped as Scholle soils in the soil survey of the Torrance Area. The included areas make up about 15 percent of the acreage.

The vegetation is one-seed juniper and pinyon pine. The understory is blue grama, hairy grama, Scribner needlegrass, sand dropseed, side-oats grama, black grama, galleta, Metcalfe muhly, spike muhly, mountainmahogany, and skunkbush sumac.

Runoff is rapid, and the hazard of water erosion is moderate.

This land type is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIs; Breaks CP range site; wildlife habitat group M.

Rock Outcrop-Akela Complex

Rock outcrop-Akela complex, 10 to 50 percent slopes (RX), occurs on basalt mountains and volcanic cinder cones in the northwestern and north-central parts of the survey area. Areas of this complex were surveyed at low intensity.

This complex (fig. 13) consists of about 45 percent Rock outcrop intermingled with about 40 percent Akela stony sandy loam. The Akela soil occurs between the rock outcrops. It has the profile described as representative of the series.

Included in the areas mapped are steep to very steep areas of Badland, which make up about 10 percent of the acreage. Also included are areas of Bluepoint soils, which make up about 5 percent of the acreage.

Runoff is rapid, and the hazard of water erosion is moderate.

This complex is used as watershed, wildlife habitat, and range. Dryland capability subclass VIIIs; wildlife habitat group M; the Akela soil is in Breaks SD range site.

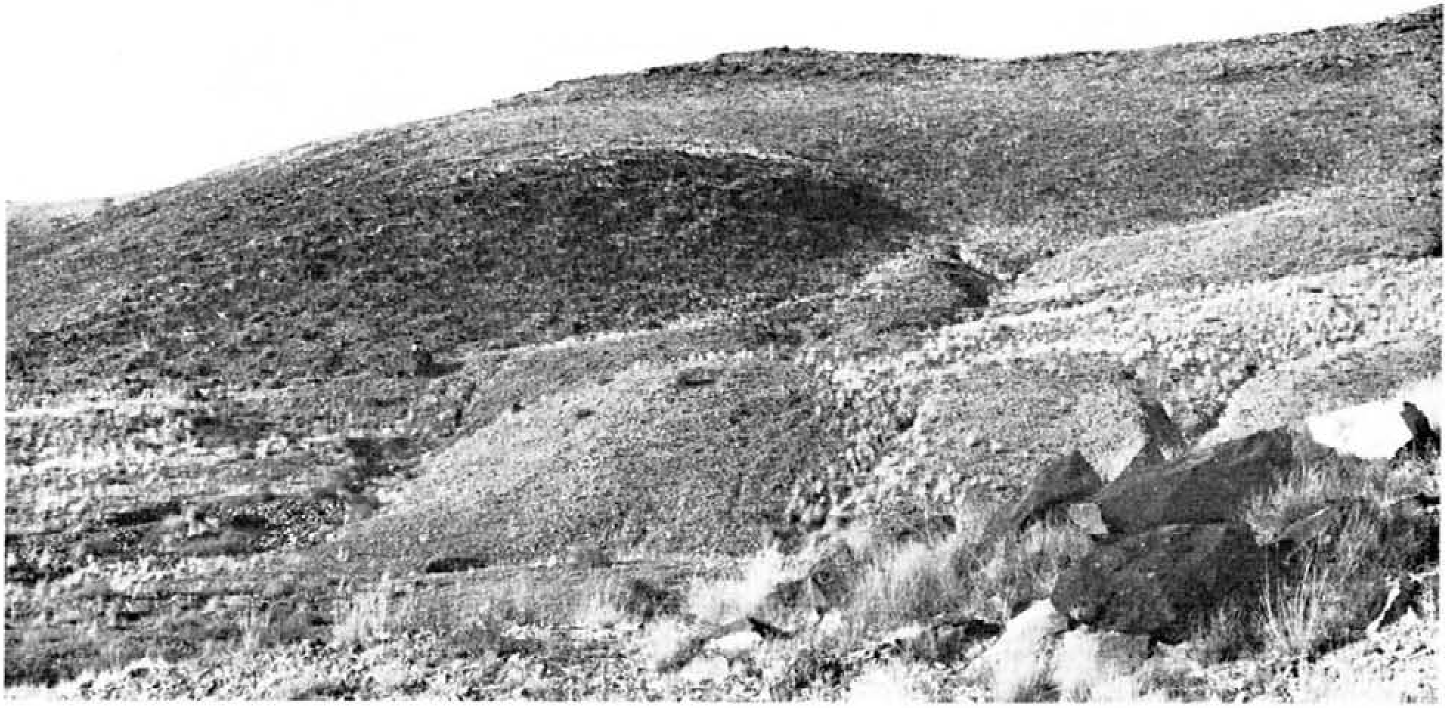

Figure 13.—An area of Rock outcrop-Akela complex, 10 to 50 percent slopes. The Akela soil in this complex is in Breaks SD range site.

Rock Outcrop and Landslides

Rock outcrop and Landslides (RZ) consists of about 50 percent bedrock escarpments and outcrops and about 25 percent landslides of rock fragments. Slopes range from 50 to 100 percent. The areas were surveyed at low intensity.

The rock outcrops are in areas where resistant sandstone or limestone has been exposed through faulting or uplifting. Igneous and metamorphic rocks occur in some areas. Less resistant sandstone, limestone, or shale occur between areas of resistant rock. The variable weathering causes stairstep or clifflike relief. Small pockets of earth material occur in fractures in the bedrock.

Landslides result from weathering of the bedrock; large fragments break loose from the bedrock and roll and slide to the base of the slope or to obstructed passages. They are in very steep areas between rock outcrops and consist of masses of rock fragments and stones broken from limestone, sandstone, igneous rock, and metamorphic rock.

Included in the areas mapped are areas of stony colluvial land at the foot of canyon walls, which make up about 15 percent of the acreage. In these places the slope is 20 to 50 percent. Also included are areas of very shallow to deep pockets of very steep soils, which make up about 10 percent of the acreage. In addition, small areas of Osha soils, along the boundary of the Torrance Area, were included.

This land type is nearly barren of vegetation. Sparse stands of side-oats grama, sand dropseed, galleta, one-seed juniper, beargrass, skunkbush sumac, and Spanish-dagger grow on the inclusions.

Runoff is very rapid, and the hazard of water erosion is severe.

This land type is used as watershed and wildlife habitat. Dryland capability subclass VIIIs; wildlife habitat group O.

Salas Series

The Salas series consists of well-drained soils on mountains. These soils formed in material weathered from schist, gneiss, and quartzite. The vegetation is principally mid grasses, shrubs, and scattered one-seed juniper. Slopes are 30 to 70 percent. Soils of the Salas series are associated with soils of the Santa Fe and Sedillo series.

Elevations range from 6,000 to 8,000 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 125 to 150 days.

In a representative profile the surface layer is brown very stony loam about 6 inches thick. The subsoil is reddish-brown, brown, and very pale brown very gravelly clay loam and very gravelly loam about 29 inches thick. The substratum is white gravelly loam that has a high content of lime. Schist bedrock begins at a depth of 39 inches.

Permeability is moderate. The available water capacity is 2 to 4.5 inches. The effective rooting depth is 20 to 40 inches.

Salas soils are used as range, wildlife habitat, and watershed.

Representative profile of Salas very stony loam, 30 to 70 percent slopes, about 19.5 miles southeast of Belen; 1.45 miles south of Bustamonte Spring:

A1—0 to 6 inches, brown (7.5YR 4/2) very stony loam, dark brown (7.5YR 3/2) moist; moderate, fine, granular structure; hard, friable, nonsticky and slightly plastic; many very fine roots; many very fine tubular pores; 50 percent stones and gravel; noncalcareous, mildly alkaline (pH 7.7); clear boundary. 5 to 8 inches thick.

B21t—6 to 14 inches, reddish-brown (5YR 4/3) very gravelly clay loam, dark reddish brown (5YR 3/3) moist; moderate, medium, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common very fine roots; many fine tubular pores; oriented clay in pores and on pebbles; 65 percent gravel and stones; noncalcareous, mildly alkaline (pH 7.8); gradual boundary. 6 to 9 inches thick.

B22t—14 to 27 inches, brown (7.5YR 4/4) very gravelly clay loam, dark brown (7.5YR 3/2) moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; medium fine tubular pores; oriented clay in pores and on pebbles; 85 percent stones and gravel; noncalcareous, mildly alkaline (pH 7.7); gradual boundary. 4 to 14 inches thick.

B3ca—27 to 35 inches, very pale brown (10YR 8/3) very gravelly loam; pale brown (10YR 6/3) moist; weak, fine, granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; few fine tubular pores and common fine interstitial pores; 70 percent stones and gravel; thin coatings of lime on stones and pebbles; common fine threads of lime; moderately calcareous, strongly alkaline (pH 8.7); clear boundary. 6 to 9 inches thick.

Cca—35 to 39 inches, white (2.5Y 8/2) gravelly loam with pockets of loam, light gray (2.5Y 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; 30 percent stones and gravel, impregnated with lime; strongly calcareous, strongly alkaline (pH 8.9); abrupt boundary. 1 to 5 inches thick.

R—39 inches, lime-coated schist bedrock.

The A horizon is brown, dark brown, or dark reddish gray in color and ranges from very gravelly loam to very stony loam in texture. Coarse fragments make up 35 to 70 percent of the A horizon.

The B2t horizon is brown, dark brown, reddish brown, or dark reddish gray in color and ranges from very gravelly loam to very flaggy clay loam in texture. Clay makes up 25 to 32 percent of the horizon, and coarse fragments make up 45 to 85 percent. The structure of the B2t horizon is moderate, fine or medium, subangular blocky. Oriented clay ranges from thin clay films on peds to clay bridging on the pebbles and in the pores. The B3 horizon is brown, reddish brown, or very pale brown in color and ranges from very gravelly loam to very flaggy clay loam in texture. Clay makes up 22 to 30 percent of the horizon, and coarse fragments make up 50 to 85 percent.

The Cca horizon is white, light brown, pinkish gray, or very pale brown in color and ranges from gravelly loam to very flaggy loam in texture. Coarse fragments make up 25 to 60 percent of the horizon.

The depth to the R horizon ranges from 20 to 40 inches.

Salas very stony loam, 30 to 70 percent slopes (SA).—This steep to very steep soil (fig. 14) is in the Manzano Mountains. It has the profile described as representative of the series. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of bedrock escarpments and rock outcrops that make up about 15 percent of the acreage. Also included are areas of south-facing, light-colored soils that make up about 15 percent of the acreage. In addition, a few areas of soils mapped in the soil survey of Torrance Area as Mirabal, Osha, Tapia, and Washoe soils are included; they are along the boundary with Torrance Area.

Runoff is rapid, and the hazard of water erosion is moderate.

This Salas soil is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIs; Gravelly WP range site; wildlife habitat group G.

Santa Fe Series

The Santa Fe series consists of well-drained soils on mountains. These soils formed in material weathered from granite. The vegetation is principally mid grasses, shrubs, one-seed juniper, and pinyon. Slopes are 25 to 70 percent. Soils of the Santa Fe series are associated with soils of the Salas and Laporte series.

Elevations range from 6,000 to 8,000 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 125 to 150 days.

In a representative profile the surface layer is dark-brown very stony loam about 6 inches thick. The subsoil is brown and strong-brown very gravelly clay loam about 18 inches thick. Granite bedrock begins at a depth of about 24 inches.

Permeability is moderate. The available water capacity is 2 to 3 inches. The effective rooting depth is 15 to 32 inches.

Santa Fe soils are used as range, watershed, and wildlife habitat.

Representative profile of Santa Fe very stony loam, 25 to 70 percent slopes, about 20 miles southeast of Belen; about 0.2 mile west of the Cibola National Forest boundary and 0.3 mile south of the Torrance County line; NW¼ sec. 6, T. 3 N., R. 5 E.:

A1—0 to 6 inches, dark-brown (10YR 3/3) very stony loam, very dark grayish brown (10YR 3/2) moist; moderate, fine, granular structure; slightly hard, friable, slightly sticky and nonplastic; many very fine roots; common fine interstitial pores; 45 percent fine gravel and 15 percent surface cover of stones; noncalcareous, moderately alkaline (pH 8.0); clear boundary. 4 to 7 inches thick.

B2t—6 to 10 inches, brown (7.5YR 4/2) very gravelly clay loam, dark brown (7.5YR 3/2) moist; moderate, fine, granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; common fine interstitial pores; thin coatings of oriented clay on some ped faces; 75 percent fine gravel; noncalcareous, moderately alkaline (pH 7.9); clear boundary. 3 to 10 inches thick.

B3t—10 to 24 inches, strong-brown (7.5YR 5/6) very gravelly clay loam, brown (7.5YR 4/4) moist; massive; hard, very friable, nonsticky and nonplastic; common very fine roots; common fine interstitial pores; oriented clay on pebbles; 80 percent weathered granitic gravel; noncalcareous, mildly alkaline (pH 7.8); diffuse boundary. 8 to 15 inches thick.

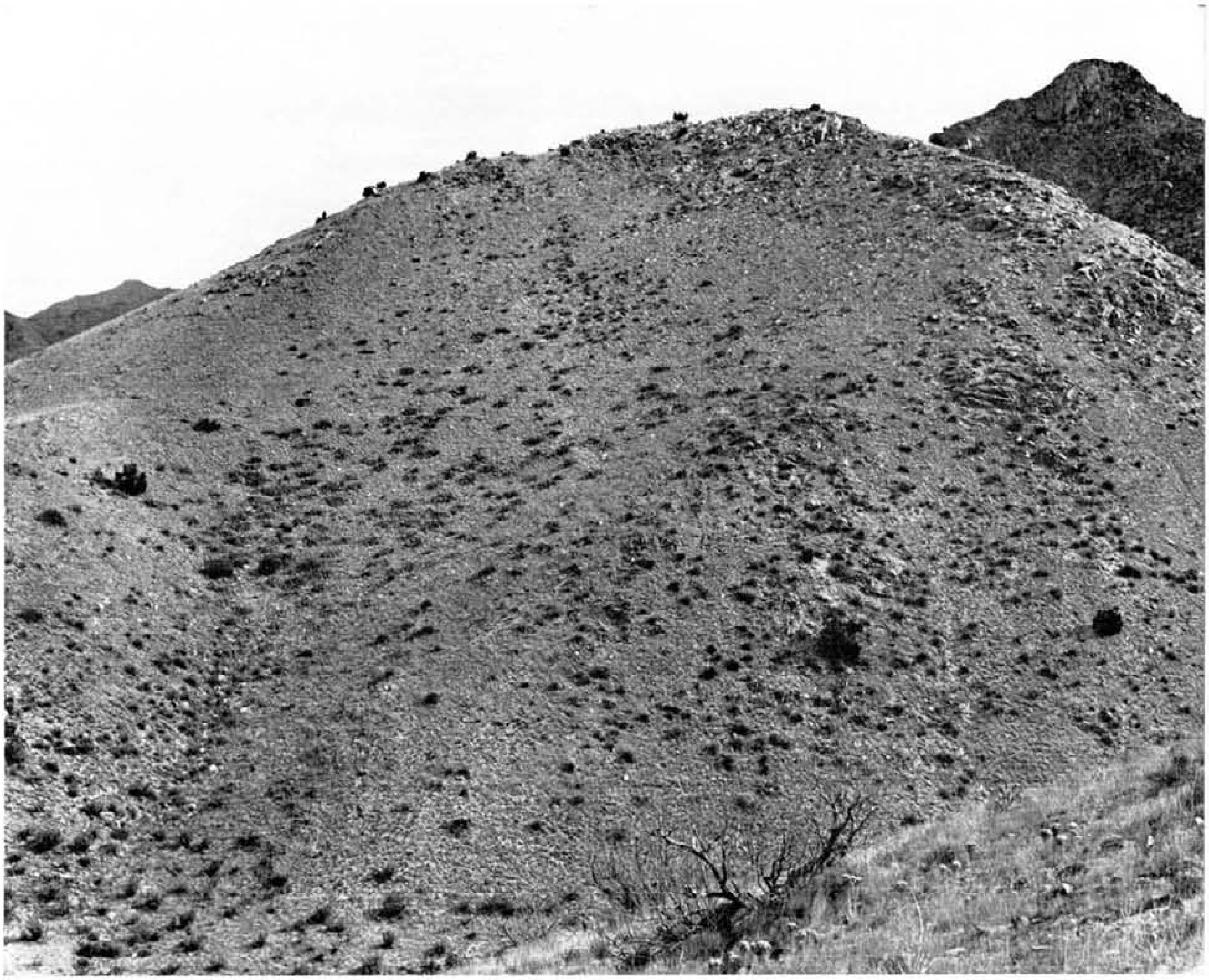

Figure 14.—An area of Salas very stony loam, 30 to 70 percent slopes.

R—24 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist), slightly weathered granite bedrock.

The A horizon is dark brown or brown in color and ranges from gravelly loam to very stony loam in texture. Coarse fragments make up 30 to 70 percent of the A horizon.

The B2t horizon is reddish brown, strong brown, or brown in color and ranges from very gravelly loam to very cobbly clay loam in texture. Coarse fragments make up 40 to 85 percent of the B2t horizon, and clay makes up 25 to 34 percent. The structure of the B2t horizon ranges from weak, fine, granular to moderate, medium, subangular blocky.

The B3t horizon is brown or strong brown in color and ranges from very gravelly loam to very stony clay loam in texture. Coarse fragments make up 50 to 90 percent of the B3t horizon, and clay makes up 25 to 35 percent.

The depth to bedrock ranges from 15 to 32 inches.

The Santa Fe soils in this survey area are a few inches deeper to bedrock than is defined in the range for the series, but this difference does not alter their usefulness or behavior.

Santa Fe very stony loam, 25 to 70 percent slopes (SF).—This moderately steep to very steep soil (fig. 15) is mainly on the eastern slopes of the Manzano Mountains. It has the profile described as representative of the Santa Fe series. This soil was surveyed at low intensity.

Included with this soil in mapping are areas of bedrock escarpments and rock outcrops, which make up about 10 percent of the acreage. Also included are areas of Tesajo soils and areas of cobbly alluvial soils, which make up about 5 percent. In addition, areas of Salas very stony loam, 30 to 70 percent slopes, are included. These areas are along the boundary with Torrance Area.

Runoff is rapid, and the hazard of water erosion is moderate.

This soil is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIs; Hills CP range site; wildlife habitat group G.

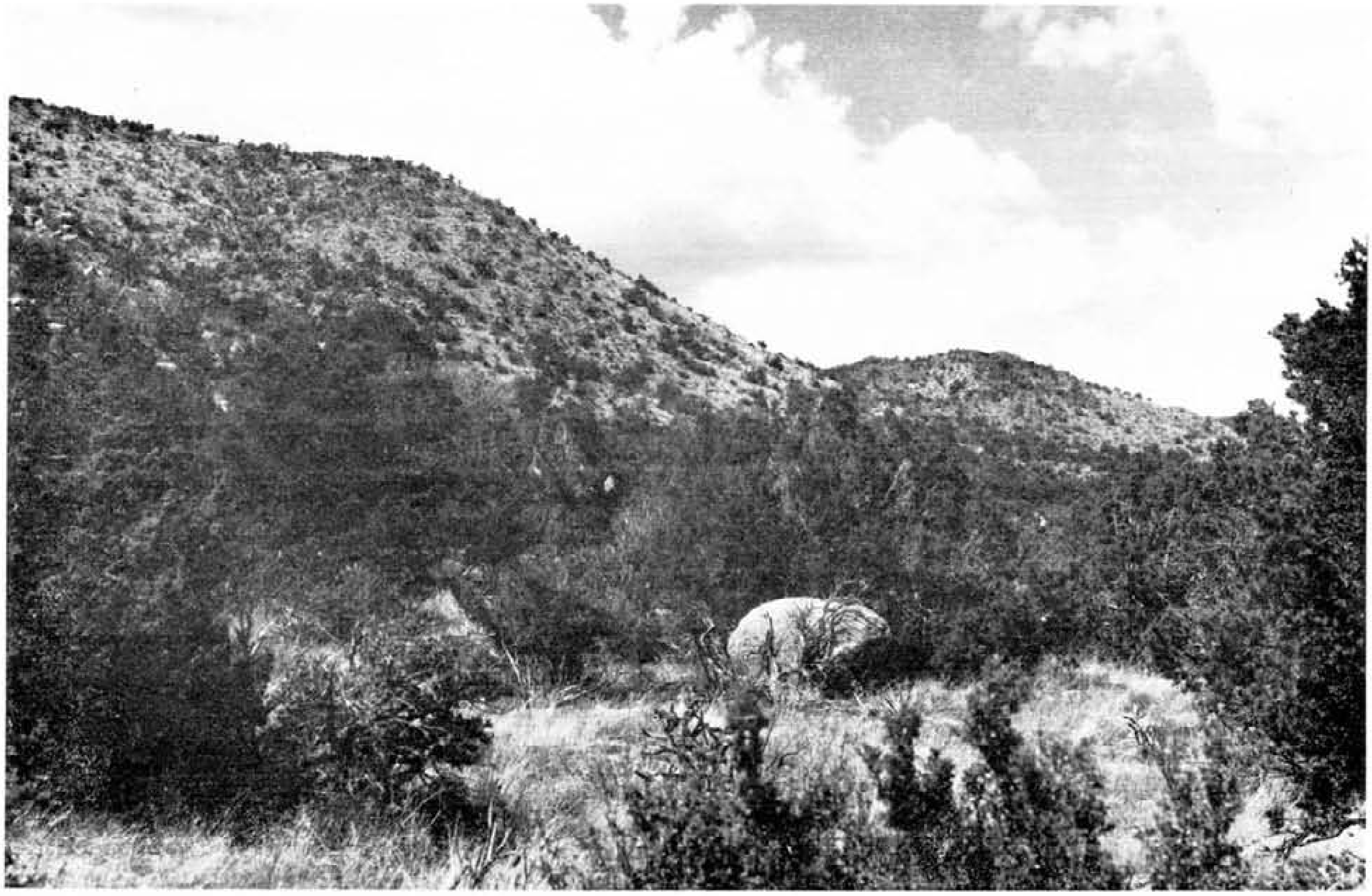

Figure 15.—**An area of Santa Fe very stony loam, 25 to 70 percent slopes. This soil is in the Hills CP range site.**

Sedillo Series

The Sedillo series consists of well-drained soils on alluvial fans and piedmonts. These soils formed in gravelly alluvium derived from schist, gneiss, and quartzite. Lesser amounts of the alluvium were derived from granite, limestone, and sandstone. The vegetation is short and mid grasses, shrubs, and scattered one-seed juniper. Slopes are 3 to 9 percent. Soils of the Sedillo series are associated with soils of the Salas and Ildefonso series.

Elevations range from 5,600 to 6,400 feet. The average annual air temperature is 50° to 53° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 145 to 170 days.

In a representative profile (fig. 16) the surface layer is brown very gravelly loam about 3 inches thick. The subsoil is reddish-brown and brown very gravelly clay loam and very gravelly sandy clay loam about 20 inches thick. The substratum is pinkish-gray very gravelly sandy loam that has a high content of lime and brown, calcareous very gravelly sandy loam. This layer extends to a depth of 60 inches or more.

Permeability is moderately slow. The available water capacity is 4 to 5 inches. The effective rooting depth is 60 inches or more.

Sedillo soils are used as range, watershed, and wildlife habitat.

Representative profile of Sedillo very gravelly loam, 3 to 9 percent slopes, about 15 miles southeast of Belen; 1.8 miles east and 0.4 mile south of ranch headquarters:

A1—0 to 3 inches, brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; many very fine roots; common very fine interstitial pores; 40 percent gravel; noncalcareous, moderately alkaline (pH 8.0); clear boundary, 2 to 5 inches thick.

B21t—3 to 9 inches, reddish-brown (5YR 4/4) very gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate, fine, subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; common very fine tubular pores; 60 percent gravel; common thin clay films on peds, on pebbles, and in pores; noncalcareous, mildly alkaline (pH 7.8); clear boundary, 4 to 9 inches thick.

B22t—9 to 16 inches, brown (7.5YR 4/4) very gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; 40 percent gravel; few thin clay films on peds, on pebbles, and in pores; noncalcareous, moderately alkaline (pH 7.9); clear boundary, 0 to 10 inches thick.

B3ca—16 to 23 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) very gravelly sandy clay loam; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 40 percent

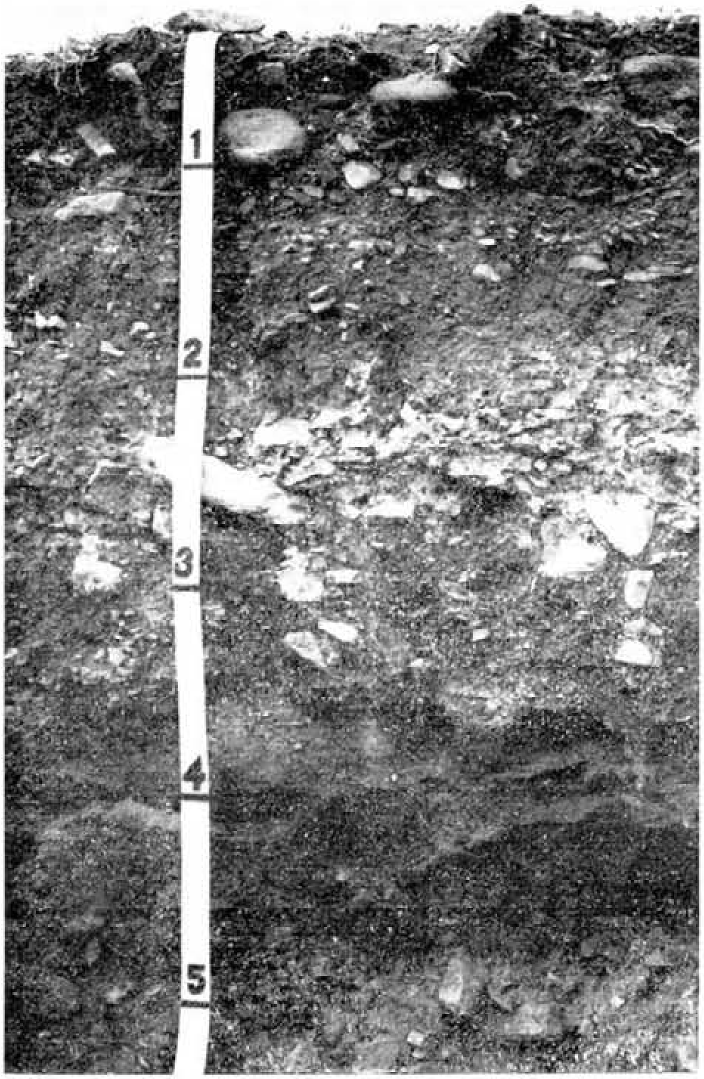

***Figure 16.*—Profile of Sedillo very gravelly loam, 3 to 9 percent slopes.**

gravel; few fine soft masses of lime and thin coatings of lime on bottom of pebbles; moderately calcareous, moderately alkaline (pH 8.3); clear boundary. 3 to 8 inches thick.

IIC1ca—23 to 50 inches, pinkish-gray (7.5YR 7/2) very gravelly sandy loam, brown (7.5YR 5/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; 60 percent gravel; many soft masses of lime; moderately thick coatings of lime on pebbles; discontinuous lenses of cemented caliche; strongly calcareous, strongly alkaline (pH 8.7); clear boundary. 10 to 30 inches thick.

IIC2—50 to 60 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) very gravelly sandy loam; massive; slightly hard, very friable, nonsticky and nonplastic; no roots; common very fine tubular pores; 60 percent gravel; thin coatings of lime on bottom and sides of pebbles; strongly calcareous, moderately alkaline (pH 8.4).

The A horizon is light brown or brown in color and ranges from gravelly loam to very gravelly loam in texture. Gravel makes up 15 to 45 percent of the horizon.

The B2t horizon is reddish brown or brown in color and ranges from very gravelly clay loam to very gravelly sandy clay loam in texture. Coarse fragments make up 35 to 65 percent of the horizon, and clay makes up 22 to 35 percent. The B3ca horizon is brown or light brown in color. It ranges from very gravelly loam to very gravelly sandy clay loam in texture. Coarse fragments make up 35 to 50 percent of the horizon, and clay makes up 20 to 28 percent.

The Cca horizon is pinkish gray or pinkish white in color and ranges from very gravelly loam to very gravelly sandy loam in texture. Coarse fragments make up 40 to 70 percent of the horizon. The consistence of the lime in this horizon ranges from soft to strongly cemented. The C2 horizon is brown or light brown in color and ranges from gravelly sandy loam to very gravelly sandy loam in texture. Coarse fragments make up 20 to 80 percent of the horizon.

Sedillo very gravelly loam, 3 to 9 percent slopes (SG).—This gently sloping to moderately sloping soil is on foot slopes of the Manzano Mountains. It has the profile described as representative of the series. The soil was surveyed at low intensity.

Included with this soil in mapping are areas of Tres Hermanos soils, areas of Sedillo very stony loam, and areas of cobbly alluvial soils. Also included, along the boundary with Torrance Area, are small areas of soils mapped in the soil survey of the Torrance Area as Clovis, Scholle, and Moriarty soils. Also included are similar soils that have more than 35 percent clay in the subsoil.

Runoff is medium, and the hazard of water erosion is moderate.

This Sedillo soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIs; Gravelly WP range site; wildlife habitat group L.

Sedillo very stony loam, 3 to 9 percent slopes (SL).—This gently sloping to moderately sloping soil is on the upper parts of alluvial fans and on foot slopes of the Manzano Mountains. It has a profile similar to the one described as representative of the series, but stones make up about 15 percent of the surface layer and gravel makes up about 30 percent. Cobblestones and gravel make up 35 to 65 percent of the subsoil and substratum. The soil was mapped at low intensity.

Included with this soil in mapping are areas of Ildefonso soils, areas of soils similar to Sedillo soils but have more than 35 percent clay in the subsoil, areas of Sedillo very gravelly loam, and areas of cobbly or stony alluvial soils. Also included, along the boundary with Torrance Area, are small areas of soils mapped in the soil survey of the Torrance Area as Clovis, La Fonda, Tesajo, and Salas soils.

This Sedillo soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIs; Gravelly WP range site; wildlife habitat group L.

Tesajo Series

The Tesajo series consists of somewhat excessively drained soils on alluvial fans. These soils formed in granite alluvium. The vegetation is principally mid grasses and shrubs. Slopes are 1 to 9 percent. Soils of the Tesajo series are associated with soils of the Millett, Sedillo, and Tres Hermanos series.

Elevations range from 5,500 to 6,400 feet. The average annual air temperature is 51° to 54° F., and the average annual precipitation is 9 to 12 inches. The frost-free season is 145 to 170 days.

In a representative profile the surface layer is dark-brown, noncalcareous gravelly loam about 7 inches thick.

The next layer is dark-brown, noncalcareous very gravelly loam about 13 inches thick. Below this is dark-brown very gravelly sandy loam that is slightly calcareous in part. This material extends to a depth of 60 inches or more.

Permeability is rapid. The available water capacity is 4.5 to 5.5 inches. The effective rooting depth is 60 inches or more.

Tesajo soils are used as range, wildlife habitat, and watershed.

Soils of the Tesajo series are not mapped separately in this survey area. They are mapped only in association with soils of the Millett series.

Representative profile of Tesajo gravelly loam, from an area of Millett-Tesajo association, sloping, approximately 0.4 mile south of Bustamonte Spring; south bank of gully in the SW¼NW¼ sec. 11, T. 3 N., R. 4 E.:

A1—0 to 7 inches, dark-brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; 30 percent fine gravel; noncalcareous, moderately alkaline (pH 8.0); clear boundary. 4 to 9 inches thick.

C1—7 to 20 inches, dark-brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak, fine, subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores and many fine tubular pores; 75 percent fine gravel; noncalcareous, moderately alkaline (pH 8.0); abrupt boundary. 10 to 15 inches thick.

C2—20 to 60 inches, dark-brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; many fine and very fine interstitial pores and many fine tubular pores; 75 to 85 percent gravel; slightly calcareous in part of the horizon, moderately alkaline (pH 8.0).

The A horizon is dark brown or grayish brown in color and ranges from very gravelly sandy loam to gravelly loam in texture. Coarse fragments make up 20 to 40 percent of the horizon. The C horizon is brown or dark brown in color and ranges from very gravelly sandy loam to very gravelly loam in texture. Coarse fragments make up 35 to 85 percent of the horizon.

Tome Series

The Tome series consists of well-drained soils on broad, slightly concave alluvial fans and terraces. These soils formed in alluvial sediment washed from limestone and shale and in mixed silty alluvium derived from metamorphic rocks. The vegetation is principally short grasses. Slopes are 0 to 3 percent. Soils of the Tome series are associated with soils of the Adelino, Armijo, and Agustin series.

Elevations range from 4,800 to 5,600 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is pale-brown, calcareous very fine sandy loam about 5 inches thick. The next layers are light yellowish-brown, calcareous loam and light clay loam about 29 inches thick. These layers are underlain by light yellowish-brown and very pale brown, calcareous fine sandy loam or very fine sandy loam to a depth of 50 inches. Below this material is yellowish-red sandy loam, which extends to a depth of more than 60 inches.

Permeability is moderately slow or slow. The available water capacity is 8.5 to 10 inches. The effective rooting depth is 60 inches or more.

Tome soils are used as range, wildlife habitat, and watershed. A few small tracts have been subdivided into building lots.

Representative profile of Tome very fine sandy loam, about 5 miles east of Tome; 1,280 feet east and 450 feet south of windmill:

A1—0 to 5 inches, pale-brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak, thin, platy structure and weak, very fine, granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and few fine roots; common very fine tubular pores and common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 2 to 6 inches thick.

AC—5 to 14 inches, light yellowish-brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine and few fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 7 to 10 inches thick.

C1—14 to 23 inches, light yellowish-brown (10YR 6/4) light clay loam, yellowish brown (10YR 5/4) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine and few fine tubular pores; few fine threads and spots of lime; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 7 to 16 inches thick.

C2—23 to 34 inches, light yellowish-brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; common, fine, distinct mottles of reddish yellow (7.5YR 6/8), strong brown (7.5YR 4/8) moist; massive; very hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; common very fine threads of lime; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 8 to 15 inches thick.

C3—34 to 42 inches, light yellowish-brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; common, fine, distinct mottles of reddish yellow (7.5YR 6/8), strong brown (7.5YR 4/8) moist; massive; very hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 0 to 12 inches thick.

C4—42 to 50 inches, very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; few, fine, distinct mottles of reddish yellow (7.5YR 6/8), strong brown (7.5YR 4/8) moist; massive; common intermittent lenses of moderate, very thin, platy structure where stratified; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); abrupt boundary. 6 to 12 inches thick.

IIBb—50 to 70 inches, yellowish-red (5YR 5/6, 5YR 4/6 moist) sandy loam; massive; very hard, friable, slightly sticky and nonplastic; no roots; many very fine tubular pores; noncalcareous, moderately alkaline (pH 8.1).

The A horizon is pale-brown or light yellowish-brown very fine sandy loam to silty clay loam. The AC horizon is pale-brown or light yellowish-brown loam, silt loam, clay loam, or silty clay loam. Clay makes up 18 to 30 percent of the AC horizon, and sand particles coarser than very fine sand make up less than 15 percent. The structure ranges from weak, fine, subangular blocky to moderate, medium, subangular blocky.

The C horizon is pale brown, light yellowish-brown, or very pale brown loam, silt loam, clay loam, silty clay loam, fine sandy loam, or very fine sandy loam. Clay makes up 18 to 30 percent of the C horizon, and sand particles coarser than very fine sand make up less than 15 percent. Stratification is common in this horizon, and in these places the structure is weak, thin, platy. The incidence of lime in the C horizon ranges from disseminated particles to a few spots and common threads.

The IIBb horizon is discontinuous and, where present, is at a depth below 30 inches.

Tome very fine sandy loam (0 to 2 percent slopes) (TM).—This level to nearly level soil is in broad, concave swales and on alluvial fans east of the Rio Grande (fig. 17). It has the profile described as representative of the series. This soil was surveyed at low intensity.

Included with this soil in mapping are areas of Adelino, Pajarito, and Agustin soils.

Permeability is moderately slow. Runoff is medium, and the hazard of water erosion is moderate. In most places this soil receives runoff from adjacent slopes.

The vegetation is mainly burrograss. Bare spots are common; these eroded areas are generally oblong in shape and are 10 to 50 feet long.

This Tome soil is used as range, watershed, and wildlife habitat. Areas used as range deteriorate rapidly if overgrazed. A few tracts have been subdivided into building lots. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Tome-Adelino association, slightly saline and alkali (0 to 3 percent slopes) (TO).—This association is along the Rio Puerco. It is 50 percent Tome very fine sandy loam and 40 percent Adelino fine sandy loam. The soils were surveyed at low intensity.

The level to nearly level Tome soil is on terraces. It is silty clay loam below a depth of 10 inches and is slightly saline and alkali. Otherwise, it has a profile similar to that described as representative of the series. Runoff is rapid, and the hazard of water erosion is moderate to severe. Permeability is slow.

The nearly level Adelino soil is on side slopes. It has a profile similar to that described as representative of the series, but the subsoil is sandy clay loam and the lower part of the subsoil contains less lime. Also, the soil is slightly saline and alkali. Runoff is rapid, and the hazard of erosion is moderate.

Included with the areas mapped are areas of Armijo and Bluepoint soils.

This association is used as watershed, range, and wildlife habitat. Dryland capability subclass VIIs; Salt Flats SD range site; wildlife habitat group I.

Tome-Arizo complex (0 to 3 percent slopes) (TN).—This complex is about 50 percent Tome loam and 40 percent Arizo very gravelly loam. Some areas of the Tome soil have an overburden, 6 to 18 inches thick, of soil material eroded from the Arizo soil. The soils were surveyed at low intensity.

The Tome soil is in broad concave swales. It has a profile similar to that described as representative of the series, but the surface layer is loam and the soil is about 5 percent fine gravel. Permeability is moderately slow.

The Arizo soil is on low, narrow, gravelly ridges on alluvial fans. It has the profile described as representative of the series. Runoff is slow, and the hazard of water erosion is moderate. This soil receives runoff from adjacent slopes and is subject to deposition and stream braiding during high-intensity storms.

Included in the areas mapped are areas of Nickel and Pajarito soils. Soils of each of these series make up about 5 percent of the acreage.

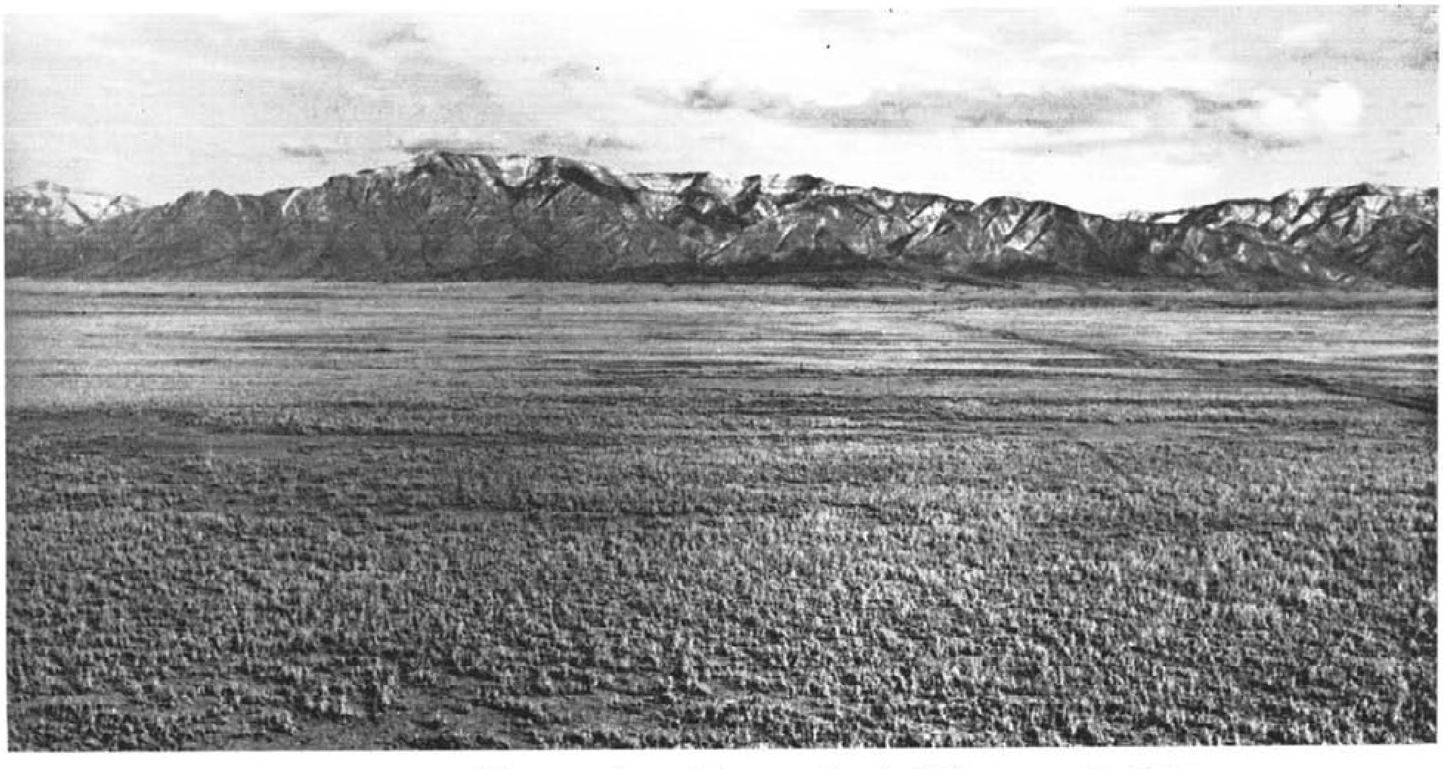

Figure 17.—An area of Tome very fine sandy loam on a broad, slightly concave alluvial fan.

This complex is used as range, wildlife habitat, and watershed. The soils are a source of sedimentation. The Arizo soil is a potential source of gravel and sand. Dryland capability subclass VIIe; the Tome soil is in Loamy SD range site and wildlife habitat group I; the Arizo soil is in Sandy SD range site and wildlife habitat group K.

Tome-Armijo association, strongly saline and alkali (0 to 1 percent slopes) (TR).—This association occurs as long, narrow areas along the Rio Puerco. It is 60 percent Tome clay loam and 25 percent Armijo clay. The soils were surveyed at low intensity.

The Tome soil has a profile similar to that described as representative of the series, but the surface layer and substratum are silty clay loam and the soil is moderately to strongly saline and alkali. Permeability is slow. Runoff is rapid, and the hazard of water erosion is moderate.

The Armijo soil has a profile similar to that described as representative of the series, but the soil is reddish-brown clay and silty clay throughout. The vegetation is sparse. Runoff is rapid, and the soil has been moderately eroded by sheet and rill erosion. The water table is below a depth of 40 feet.

Included with the areas mapped are areas of Adelino soils, which make up 15 percent of the acreage.

This association is used as watershed, range, and wildlife habitat. Dryland capability subclass VIIs; Salt Flats SD range site; wildlife habitat group I.

Tres Hermanos Series

The Tres Hermanos series consists of well-drained soils on piedmont fans. These soils formed in old mixed alluvium. The vegetation is principally short and mid grasses and forbs. Slopes are 1 to 5 percent. Soils of the Tres Hermanos series are associated with soils of the Madurez and Sedillo series.

Elevations range from 5,200 to 5,800 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown loam about 4 inches thick. The subsoil is reddish-brown clay loam about 16 inches thick. The substratum is pink very gravelly sandy loam and gravelly sandy loam that has a high content of lime. This material extends to a depth of 60 inches or more.

Permeability is moderate. The available water capacity is 4 to 5 inches. The effective rooting depth is 20 to 30 inches.

Tres Hermanos soils are used as range, wildlife habitat, and watershed. Several tracts have been subdivided into building lots.

Representative profile of Tres Hermanos loam, from an area of Tres Hermanos-Madurez association, gently sloping; about 18 miles southeast of Belen; 0.3 mile south of farm pond and gate, 20 feet east of ranch road:

A1—0 to 4 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; weak, fine, subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores; 10 percent fine gravel; noncalcareous, moderately alkaline (pH 8.1); clear boundary. 2 to 6 inches thick.

B21t—4 to 9 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; 10 percent fine gravel; thin discontinuous clay films on peds and in pores; noncalcareous, moderately alkaline (pH 8.1); clear boundary. 4 to 6 inches thick.

B22tca—9 to 20 inches, reddish-brown (5YR 5/4, 5YR 4/4 moist) clay loam; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; 15 percent fine gravel; common thin clay films in pores; few fine threads of lime; slightly calcareous, moderately alkaline (pH 8.3); clear boundary. 3 to 12 inches thick.

IIC1ca—20 to 25 inches, pink (7.5YR 8/4, 7.5YR 7/4 moist) very gravelly sandy loam; massive; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; 40 percent fine gravel; many mottles of soft lime; thin coatings of lime on pebbles; strongly calcareous, strongly alkaline (pH 8.5); gradual boundary. 4 to 16 inches thick.

IIC2ca—25 to 60 inches, pink (7.5YR 8/4, 7.5YR 7/4 moist) gravelly sandy loam; massive; hard, friable, nonsticky and nonplastic; no roots; few very fine tubular pores and common very fine interstitial pores; 20 percent fine gravel; many mottles of soft lime, decreasing with depth; thin coatings of lime on pebbles; strongly calcareous, strongly alkaline (pH 8.7).

The A horizon is brown or reddish brown in color and ranges from loam to fine sandy loam in texture. Gravel makes up 5 to 15 percent of this horizon. The B2t horizon is reddish brown or yellowish red in color and ranges from clay loam to heavy loam or sandy clay loam in texture. Clay makes up 25 to 35 percent of the B2t horizon, and gravel makes up 5 to 20 percent. The Cca horizon is pink, pinkish gray, or light brown in color and ranges from gravelly loam to very gravelly sandy loam in texture. Gravel makes up 20 to 50 percent of the Cca horizon.

Tres Hermanos fine sandy loam (1 to 5 percent slopes) (Ts).—This nearly level to gently sloping soil is on piedmont fans in the northeastern part of the survey area. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam about 6 inches thick, and the subsoil is clay loam to sandy clay loam about 18 inches thick. Also, the substratum contains less lime than that of the representative profile.

Included with this soil in mapping are small areas of Madurez, Wink, and Agustin soils.

Runoff is slow, and the hazard of erosion is moderate.

This Tres Hermanos soil is used as range, community development, watershed, and wildlife habitat. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Tres Hermanos-Madurez association, gently sloping (TU).—This nearly level to gently sloping association is on piedmont fans in the eastern part of the survey area. It is 65 percent Tres Hermanos loam that has 1 to 5 percent slopes, and 25 percent Madurez fine sandy loam that has 1 to 5 percent slopes. The soils were surveyed at low intensity.

In places this association joins soils that were mapped in the Torrance Area as Tesajo gravelly sandy loam, 2 to 15 percent slopes. The Tres Hermanos and Madurez soils of the East Valencia Area contain more clay, more lime, less organic matter, and less gravel than the Tesajo soils of the Torrance Area.

The Tres Hermanos soil is mainly gently sloping. It is on the slightly convex upper parts of piedmont fans.

It has the profile described as representative of the series. Runoff is medium, and the hazard of water erosion is moderate.

The Madurez soil is mainly nearly level to gently sloping. It is on the slightly concave lower parts of piedmont fans. It has a profile similar to that described as representative of the Madurez series, but the surface layer is brown fine sandy loam about 5 inches thick. Runoff is medium. The hazard of soil blowing is moderate.

Included with the areas mapped are areas of Sedillo, Wink, and Latene soils. The included soils make up about 10 percent of the acreage.

This association is used as range, watershed, and wildlife habitat. Several tracts have been subdivided into building lots. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Vinton Series

The Vinton series consists of well-drained soils on the flood plain of the Rio Grande. These soils formed in recent alluvium. The native vegetation is principally alkali sacaton, saltgrass, dropseeds, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of the Vinton series are associated with soils of the Agua, Bluepoint, and Gila series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is brown loam and sandy clay loam 11 inches thick. The next layers are light-brown and light yellowish-brown loamy fine sand and loamy sand about 27 inches thick. These layers are underlain by light yellowish-brown fine sand to a depth of 60 inches or more.

Permeability is moderately rapid. The available water capacity is 5 to 6 inches. The effective rooting depth is 60 inches or more.

Vinton soils are used for irrigated hay, small grains, row crops, and pasture. They are also used in community development and as native pasture and wildlife habitat.

Representative profile of Vinton loam, about 2.3 miles south of the center of Belen; 350 feet west of Interstate Highway 25 and 300 feet east of cottonwood tree:

Ap1—0 to 2 inches, brown (7.5YR 5/3, 7.5YR 4/3 moist) loam; weak, thin, platy structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine vesicular pores and few very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.1); abrupt boundary. 0 to 3 inches thick.

Ap2—2 to 11 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) sandy clay loam; weak, fine and medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); abrupt boundary. 7 to 12 inches thick.

C1—11 to 24 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.0); clear boundary. 10 to 18 inches thick.

C2—24 to 38 inches, light yellowish-brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; slightly calcareous, moderately alkaline (pH 8.0); gradual boundary. 8 to 20 inches thick.

C3—38 to 60 inches, light yellowish-brown (10YR 6/4) fine sand, yellowish brown (10YR 5/4) moist; single grained; loose when dry or moist, nonsticky and nonplastic; no roots; common very fine insterstitial pores; slightly calcareous, moderately alkaline (pH 8.1).

The A horizon is brown or light brown in color and loam, heavy fine sandy loam, sandy clay loam, or clay loam in texture. The C horizon is light brown, pink, pale brown, or light yellowish brown. The texture at depths between 10 and 40 inches averages loamy fine sand, but there are thin strata of fine sandy loam or sand.

Vinton clay loam (0 to 1 percent slopes) (Vm).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam about 13 inches thick.

Included with this soil in mapping are areas of Gila and Agua soils and areas of Vinton loam.

Runoff is slow, and the hazard of erosion is slight.

This Vinton soil is used primarily for irrigated alfalfa, small grains, row crops, permanent pasture, and wildlife habitat. Small tracts are used for community development and unimproved native pasture. Capability unit IIs-5, irrigated; wildlife habitat group C.

Vinton loam (0 to 1 percent slopes) (Vg).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Gila, Agua, and Brazito soils and areas of Vinton soils that have a sandy clay loam surface layer and Vinton soils that have a fine sandy loam surface layer.

Runoff is very slow to slow, and the hazard of erosion is slight.

This Vinton soil is used for irrigated alfalfa, small grains, row crops, permanent pasture, and wildlife habitat. It is also used in community development and as unimproved native pasture. Capability unit IIs-1, irrigated; wildlife habitat group C.

Vinton loam, moderately saline and alkali (0 to 1 percent slopes) (Vk).—This level soil is in the irrigated Rio Grande valley. Rough microrelief is common. The profile of this soil is similar to the one described as representative of the series, but the surface layer is loam or fine sandy loam about 10 inches thick, the soil has more than 0.35 percent soluble salts, is strongly alkaline to very strongly alkaline, and is more than 15 percent exchangeable sodium. The soil has a seasonal water table at a depth of 40 inches. The surface soil is dispersed; it crusts easily and white salts are common on the surface. In about 50 percent of the acreage, a substratum of silty clay loam begins at depths below 37 inches. The available water capacity is 3 to 4 inches.

Included with this soil in mapping are areas of Gila soils and areas of Vinton loamy fine sand, moderately alkali.

Runoff is slow, and the hazard of erosion is slight.

This Vinton soil is commonly used for unimproved native pasture or as idle land. It is also used for irrigated alfalfa, small grains, and permanent pasture. Capability unit IVs-3, irrigated; wildlife habitat group C.

Vinton loamy fine sand (0 to 1 percent slopes) (Vd).—This level soil is in the irrigated Rio Grande valley. Rough microrelief is common. The profile of this soil is similar to the one described as representative of the series, but the surface layer is light-brown loamy fine sand about 8 inches thick.

Included with this soil in mapping are areas of Gila and Bluepoint soils.

Runoff is very slow. The hazard of soil blowing is moderately severe. The available water capacity is 4 to 5 inches.

Many tracts of this Vinton soil are used as unimproved native pasture and as wildlife habitat. This soil is also used for irrigated alfalfa, small grains, and permanent pasture. Capability unit IIIe-1, irrigated; wildlife habitat group C.

Vinton loamy fine sand, slightly saline (0 to 1 percent slopes) (Ve).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is loamy fine sand about 8 inches thick, the soil has more than 0.18 percent soluble salts, and a seasonal water table is at a depth of 47 inches.

Included with this soil in mapping are areas of Gila and Bluepoint soils.

Runoff is very slow. The hazard of soil blowing is moderate.

This Vinton soil is used primarily for irrigated alfalfa, small grains, sorghum, and permanent pasture. Capability unit IIIs-4, irrigated; wildlife habitat group C.

Vinton loamy fine sand, moderately alkali (0 to 1 percent slopes) (Vf).—This level soil is in the irrigated Rio Grande valley. Rough microrelief is common. The profile of this soil is similar to the one described as representative of the series, but the surface layer is loamy fine sand about 11 inches thick. Also, in about 35 percent of the acreage, the surface layer is strongly to very strongly alkaline and has more than 15 percent exchangeable sodium. In most places this soil has a crust on the surface.

Included with this soil in mapping are areas of Bluepoint and Brazito soils.

Runoff is slow. The hazard of soil blowing is moderate.

This Vinton soil is used primarily for idle land, unimproved native pasture, and wildlife habitat. It is also used for irrigated alfalfa, small grains, permanent pasture, and community development. Capability unit IIIs-5, irrigated, wildlife habitat group C.

Vinton loam, slightly saline (0 to 1 percent slopes) (Vh).—This level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is sandy clay loam or loam about 8 inches thick, the soil has about 0.25 percent soluble salts, and a seasonal water table is at a depth of about 48 inches. White salts are common on the surface and in the profile.

Included with this soil in mapping are areas of Gila and Agua soils and areas of Vinton loam, moderately saline and alkali.

Runoff is slow, and the hazard of erosion is slight.

This Vinton soil is used for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. Capability unit IIIs-4, irrigated; wildlife habitat group C.

Vinton Variant

The loamy subsoil variant of the Vinton series consists of well-drained soils on the flood plain of the Rio Grande. These soils formed in recent alluvium. The native vegetation is principally alkali sacaton, saltgrass, dropseeds, and fourwing saltbush. Slopes are 0 to 1 percent. Soils of this series are associated with soils of the Agua, Gila, and Glendale series.

Elevations range from 4,750 to 4,950 feet. The average annual air temperature is 54° to 57° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

In a representative profile the surface layer is light-brown loam and sandy clay loam about 14 inches thick. The next layers are light-brown loamy fine sand about 20 inches thick, and brown silty clay loam about 20 inches thick. Below this is light-brown sandy clay loam to a depth of 60 inches or more.

Permeability is moderately rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is 7 to 7.5 inches. The effective rooting depth is 60 inches or more.

Soils of the Vinton variant are used for irrigated hay, small grains, row crops, and pasture. They are also used in community development, native pasture, and wildlife habibat.

Representative profile of Vinton loam, loamy subsoil variant, about 1 mile north of railroad overpass on U.S. Highway 85, north of Belen and 750 feet west of Los Chavez Drain:

Ap1—0 to 3 inches, light-brown (7.5YR 6/3) loam, brown (7.5YR 4/2) moist; weak, thin, platy structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); clear boundary. 2 to 8 inches thick.

Ap2—3 to 14 inches, light-brown (7.5YR 6/3) sandy clay loam, brown (7.5YR 4/2) moist; weak, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.2); abrupt boundary. 3 to 10 inches thick.

C1—14 to 34 inches, light-brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; slightly calcareous, moderately alkaline (pH 8.2); clear boundary, 18 to 30 inches thick.

IIC2—34 to 54 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) silty clay loam; massive; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 12 to 24 inches thick.

IIIC3—54 to 60 inches, light-brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; very hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline (pH 8.4).

The A horizon is brown or light brown in color and loam, heavy fine sandy loam, or sandy clay loam in structure. The C horizon is light brown, brown, or pale brown. Its texture is loamy fine sand or loamy sand, and the horizon contains thin strata of fine sandy loam. The IIC horizon is silty clay loam, clay loam, sandy clay loam, or heavy loam.

Vinton loamy fine sand, loamy subsoil variant (0 to 1 percent slopes) (Vn).—This level and nearly level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is loamy fine sand about 6 inches thick, and a substratum of heavy loam or clay loam begins at depths below 28 inches. Permeability is moderately slow in the lower part of the substratum. In about 25 percent of the acreage, this soil is moderately saline and alkali and a seasonal water table is at a depth of 40 inches.

Included with this soil in mapping are areas of Gila soils and areas of Vinton loamy fine sand.

Runoff is very slow. The hazard of soil blowing is moderate.

This loamy subsoil variant of the Vinton soils is used for irrigated alfalfa, small grains, permanent pasture, unimproved native pasture, and wildlife habitat. Some tracts are used in community development. Capability unit IIe-1, irrigated; wildlife habitat group B.

Vinton loam, loamy subsoil variant (0 to 1 percent slopes) (Vo).—This level soil is in the irrigated Rio Grande valley. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Gila soils and areas of Vinton loam.

Runoff is slow, and the hazard of erosion is slight.

This loamy subsoil variant of the Vinton soils is used for irrigated alfalfa, small grains, row crops, permanent pasture, and wildlife habitat. Capability unit IIs-1, irrigated; wildlife habitat group B.

Vinton clay loam, loamy subsoil variant (0 to 1 percent slopes) (Vt).—This level and nearly level soil is in the irrigated Rio Grande valley. It has a profile similar to the one described as representative of the series, but the surface layer is clay loam about 13 inches thick, and a layer of heavy loam to clay loam begins at a depth of 31 inches.

Included with this soil in mapping are areas of Gila and Agua soils and areas of Vinton clay loam.

Runoff is slow, and the hazard of erosion is slight.

This loamy subsoil variant of the Vinton soils is used primarily for irrigated alfalfa, small grains, sorghums, permanent pasture, and wildlife habitat. Capability unit IIs-5, irrigated; wildlife habitat group B.

Wink Series

The Wink series consists of well-drained soils on piedmonts. These soils formed in old unconsolidated alluvium that has been modified by wind. The vegetation is principally short and mid grasses and shrubs. Slopes are 0 to 9 percent. Soils of the Wink series are associated with soils of the Bluepoint and Madurez series.

Elevations range from 4,900 to 5,700 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown loamy sand about 9 inches thick. The subsoil is light-brown sandy loam about 12 inches thick. The substratum is light-brown and pinkish-white sandy loam that has a high content of lime. The substratum extends to a depth of 60 inches or more.

Permeability is moderately rapid except where unconformable clay is in the substratum. In these places permeability is slow. The available water capacity is 6 to 7 inches. The effective rooting depth is 60 inches or more.

Wink soils are used as range, watershed, and wildlife habitat. Many tracts have been subdivided into building lots.

Representative profile of Wink loamy sand, 55 feet east and 85 feet north of road intersection: 0.35 mile north of south boundary of Rio Grande Estates and 0.3 mile west of gasline road:

A11—0 to 4 inches, brown (7.5YR 5/4), 7.5YR 4/4 moist) loamy sand; single grained; loose when dry or moist, nonsticky and nonplastic; common fine roots; common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.3); clear boundary. 3 to 6 inches thick.

A12—4 to 9 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) loamy sand; massive; soft, very friable, nonsticky and nonplastic; common fine roots and many very fine roots; few fine tubular pores and common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.3); clear boundary. 3 to 8 inches thick.

B2—9 to 21 inches, light-brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; very weak, medium, subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots and many very fine roots; common fine tubular pores; few threads of lime, increasing with depth; strongly calcareous, moderately alkaline (pH 8.4); gradual boundary. 10 to 25 inches thick.

C1ca—21 to 31 inches, light-brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine roots; common fine tubular pores; common threads and soft masses of lime that are pinkish white (7.5YR 8/2) and light brown (7.5YR 6/4); strongly calcareous, moderately alkaline (pH 8.4); gradual boundary. 8 to 20 inches thick.

C2ca—31 to 60 inches, pinkish-white (7.5YR 8/2) sandy loam, pinkish gray (7.5YR 6/2) moist; massive; very hard, firm, slightly sticky and slightly plastic; no roots; few fine tubular pores; horizon is impregnated with lime, which decreases below a depth of 48 inches; strongly calcareous, moderately alkaline (pH 8.4).

The A horizon is light yellowish brown, light brown, or brown in color and ranges from loamy sand to loamy fine sand to fine sandy loam. It ranges from weak platy structure to single grained or massive in the uppermost few inches to massive or very weak, fine, subangular blocky structure in the lower part.

The B2 horizon is pale brown, light brown, brown, or pinkish gray. Its structure is weak or very weak, fine or medium, subangular blocky. Segregated lime ranges from few to many fine threads and splotches.

The Cca horizon is light brown, pink, pinkish gray, pinkish white, light gray, or white. It ranges from light sandy loam to loam in texture. The lime content of the Cca horizon ranges from many soft masses to a horizon that is highly impregnated with lime. The calcium carbonate equivalent ranges from 25 to 45 percent. In most places the lime content decreases below a depth of 48 inches. In places unconformable material that ranges from heavy clay loam to clay and from strongly alkaline to very strongly alkaline occurs below a depth of 40 inches.

Wink fine sandy loam (1 to 5 percent slopes) (WO).—This nearly level to gently sloping soil is on the mesa west of the Rio Grande and on the piedmont west of the Rio Puerco. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam about 3 inches thick. This soil was surveyed at low intensity.

Included with this soil in mapping are areas of Madurez, Latene, and Adelino soils.

Runoff is medium, and the hazard of erosion is moderate.

The vegetation is mainly mid grasses, shrubs, and a few one-seed juniper trees.

This Wink soil is used as range, wildlife habitat, and watershed. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Wink loamy sand (1 to 5 percent slopes) (Wk).—This gently undulating and undulating soil is on piedmont uplands east of the Rio Grande. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Madurez and Pajarito soils and areas of Wink loamy sand, hummocky, and Wink fine sandy loam.

Runoff is slow. The hazard of soil blowing is severe.

This Wink soil is used as range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Wink loamy sand, hummocky (Wn).—This undulating soil is on piedmont uplands east of the Rio Grande. It has a profile similar to the one described as representative of the series, but the surface layer is light yellowish-brown loamy sand 12 to 25 inches thick. The soil is hummocky, and the hummocks are 1 to 2 feet high.

Included with this soil in mapping are areas of Wink loamy sand and areas of Madurez and Bluepoint soils.

Runoff is slow. The hazard of soil blowing is severe.

The vegetation is mainly mid grasses and shrubs.

This Wink soil is used as range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; Deep Sand SD range site; wildlife habitat group E.

Wink loamy sand, clayey substratum (1 to 5 percent slopes) (Wm).—This gently undulating to undulating soil is in broad depressions along the edge of the piedmont east of the Rio Grande. It has a profile similar to the one described as representative of the series, but it has a clayey, slowly permeable substratum at depths of 40 to 60 inches. In about 50 percent of the acreage, the clayey substratum is at depths between 40 and 60 inches, and in about 20 percent of the acreage the clayey substratum is at depths between 25 and 40 inches. This substratum is very strongly alkaline. In another 20 percent of the acreage of this soil, the clayey substratum is lacking within 60 inches of the surface.

Included with this soil in mapping are areas of Madurez soils and areas of Wink complex, 1 to 9 percent slopes, eroded. These inclusions make up about 10 percent of the acreage.

Runoff is medium. The hazard of soil blowing is severe.

The vegetation is mainly short and mid grasses and shrubs.

This Wink soil is used as range, watershed, community development, and wildlife habitat. Dryland capability subclass VIIe; Sandy SD range site; wildlife habitat group E.

Wink-Caliza complex, 1 to 15 percent slopes (Wr).—This complex consists of about 50 percent Wink loamy sand that has 1 to 9 percent slopes, and about 40 percent Caliza gravelly sandy loam that has 5 to 15 percent slopes. The soils occur in an intricate pattern.

The Wink soil is at the base of ridges and knolls. It is mainly nearly level to moderately sloping. This soil has a profile similar to the one described as representative of the series, but pebbles cover 5 to 10 percent of the surface and gravel commonly makes up 5 to 15 percent of the soil material throughout the profile. Runoff is medium. The hazard of soil blowing is moderate.

The Caliza soil is on the upper part of ridges and knolls. It is gently rolling to hilly. This soil has a profile similar to the one described as representative of the series, but gravel makes up about 20 percent of the uppermost 6 inches of the soil material. Runoff is rapid, and the hazard of water erosion is moderate.

Included in the areas mapped are areas of Pajarito and Bluepoint soils. These inclusions make up about 10 percent of the acreage.

This complex is used as range, watershed, wildlife habitat, and community development. Dryland capability subclass VIIe; the Wink soil is in Sandy SD range site and wildlife habitat group E; the Caliza soil is in River Breaks SD range site and wildlife habitat group K.

Wink-Madurez association, gently sloping (WU).—This association (fig. 18) consists of about 65 percent Wink fine sandy loam that has 1 to 5 percent slopes, and 20 percent Madurez fine sandy loam that has 1 to 5 percent slopes. The soils were surveyed at low intensity.

The Wink soil occurs on slightly convex piedmont fans. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam about 5 to 10 inches thick. Runoff is medium, and the hazard of soil blowing is moderate.

The Madurez soil is mainly on slightly concave piedmont fans. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam about 5 inches thick. The hazard of soil blowing is moderate.

Included in the areas mapped are areas of Caliza, Latene, and Tres Hermanos soils. These inclusions make up about 15 percent of the acreage.

This association is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Loamy SD range site; wildlife habitat group I.

Wink Variant

The clayey subsoil variant of the Wink series consists of well-drained soils on terraces of the ancestral Rio Grande. These soils formed in old unconsolidated alluvium. Slopes are 1 to 9 percent. Soils of this series are associated with soils of the Caliza and Wink series.

Elevations range from 4,800 to 5,000 feet. The average annual air temperature is 57° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

In a representative profile the surface layer is brown and light-brown, calcareous loamy sand about 10 inches thick. The subsoil is light-brown, calcareous sandy loam about 13 inches thick. The substratum is light-brown, calcareous sandy loam in the upper 8 inches; pinkish-gray, calcareous heavy clay loam in the next 8 inches; and light yellowish-brown, calcareous sandy clay loam underlain by pinkish-gray, calcareous clay that extends to a depth of more than 60 inches.

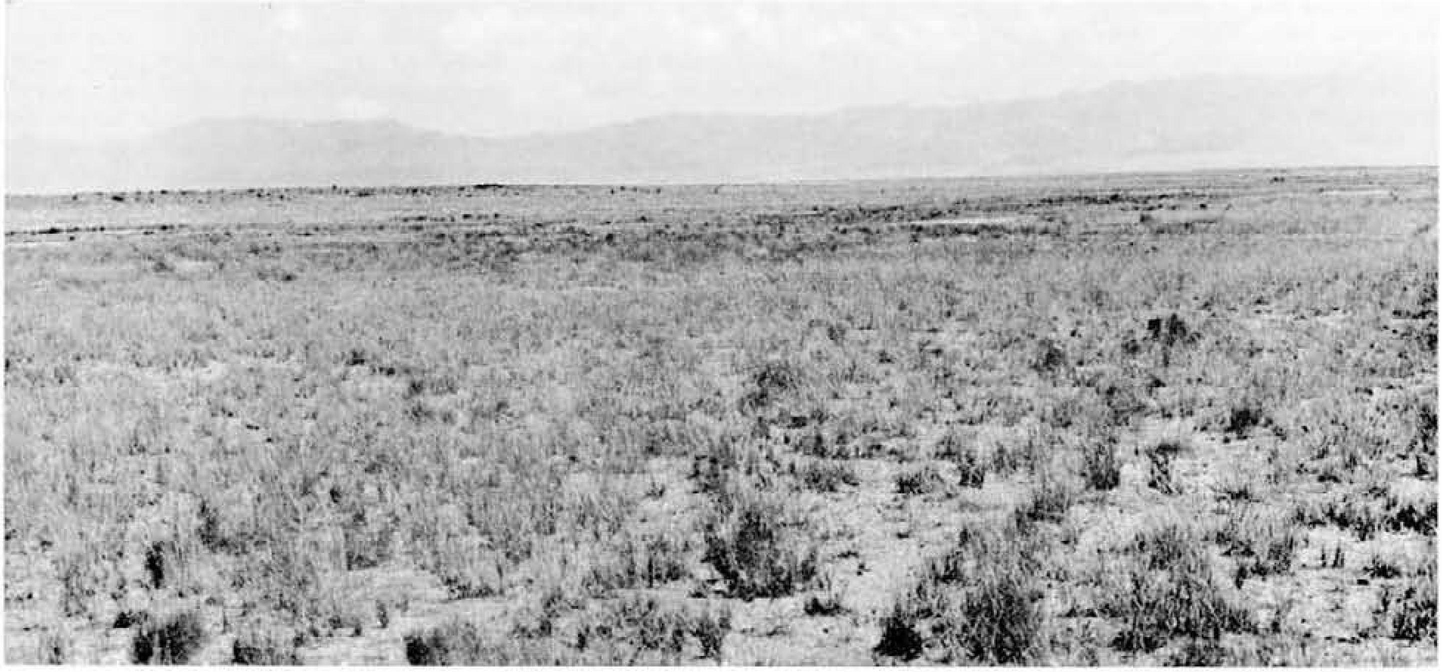

Figure 18.—An area of Wink-Madurez association, gently sloping. An area of Madurez soil is in the foreground, and an area of Wink soil is in the background.

Permeability is moderately rapid in the upper part of the soil and slow in the lower part. The available water capacity is 5 to 6 inches. The effective rooting depth is more than 60 inches.

Soils of this series are used as range, watershed, and wildlife habitat.

Representative profile of Wink loamy sand, clayey subsoil variant, from an area of Wink complex, 1 to 9 percent slopes, eroded, about 0.7 mile south and 1 mile east of Casa Colorada School; 0.15 mile south of ranch road and 0.45 mile west of El Paso Natural Gas Company pipeline:

A11—0 to 4 inches, brown (7.5YR 5/4, 7.5YR 4/4 moist) loamy sand; massive; soft, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.4); clear boundary. 2 to 6 inches thick.

A12—4 to 10 inches, light-brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; common fine interstitial pores; moderately calcareous, moderately alkaline (pH 8.4); diffuse boundary. 4 to 10 inches thick.

B2—10 to 23 inches, light-brown (7.5YR 6/4) light sandy loam, brown (7.5YR 5/4) moist; very weak, coarse, subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; few fine tubular pores; few threads of lime in lower part of horizon; strongly calcareous, moderately alkaline (pH 8.4); clear boundary. 6 to 16 inches thick.

C1ca—23 to 31 inches, light-brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; common soft masses of lime, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; strongly calcareous, strongly alkaline (pH 8.9); gradual boundary. 6 to 14 inches thick.

IIC2ca—31 to 39 inches, pinkish-gray (7.5YR 6/2) heavy clay loam, brown (7.5YR 5/4) moist; weak, medium, subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; common fine tubular pores; some tonguing along peds from C1ca horizon; common soft masses of lime, pinkish white (7.5YR 8/2) and light brown (7.5YR 6/4) moist; strongly calcareous, very strongly alkaline (pH 9.1); gradual boundary. 6 to 10 inches thick.

IIIC3—39 to 59 inches, light yellowish-brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; very few very fine roots; few fine tubular pores; few threads and soft masses of lime; moderately calcareous, moderately alkaline (pH 8.3); clear boundary. 0 to 25 inches thick.

IVC4—59 to 65 inches, pinkish-gray (7.5YR 6/2) clay, brown (7.5YR 5/4) moist; massive; very hard, extremely firm, sticky and plastic; no roots; very few fine tubular pores; common threads and masses of salts; moderately calcareous, strongly alkaline (pH 9.0).

The A horizon is light yellowish brown, light brown, or brown in color and loamy sand or loamy fine sand in texture. The B2 horizon is pale brown, light brown, or brown in color and light sandy loam or light loam in texture. The Cca horizon is light brown, pink, pinkish gray, or white. The IIC2ca horizon ranges from heavy clay loam to clay in texture. The depth to this horizon ranges from 18 to 40 inches.

Wink complex, 1 to 9 percent slopes, eroded (Ws).—This complex is in broad, concave swales above river breaks. The areas are east of New Mexico Highway 47.

Wink loamy sand, clayey subsoil variant, makes up 45 percent of the acreage. About 30 percent consists of unvegetated scab spots where the soil is 2 to 18 inches deep over a clayey, very strongly alkaline substratum. About 15 percent is soil that is similar to the scab spots but that supports vegetation. The scab spots are strongly to very strongly alkaline, and the soil material is dispersed.

The Wink soil is eroded, and hummocks that are 6 inches to more than 2 feet high have formed. The surface layer ranges from loamy sand where the soil is hummocky to clay loam or clay between the hummocks.

Included in the areas mapped are areas of Caliza and Madurez soils. These inclusions make up about 10 percent of the acreage.

Runoff is medium to rapid. The hazards of soil blowing and water erosion are moderate to severe.

The vegetation is mainly alkaline-tolerant mid grasses.

This complex is used as range, watershed, and wildlife habitat. Dryland capability subclass VIIe; Salt Flats SD range site; wildlife habitat group I.

Use and Management of the Soils

This section discusses general management practices for irrigated cropland and pasture, the capability grouping of soils, management of irrigated cropland by capability units, estimated yields of crops on irrigated soils, and the dryland capability classification of soils. It also describes the rangeland of the survey area by range sites, describes the wildlife habitat by wildlife habitat groups, and interprets soil data for engineering uses and for town and country planning.

General Management Practices for Irrigated Cropland and Pasture

Important practices for managing the irrigated soils are described in the following paragraphs.

Cropping systems.—A good cropping system includes growing suitable crops in combination with cultural and management measures needed to maintain or increase the amount of organic matter in the soil; improve fertility and soil structure; furnish protection from erosion; help to control weeds, insects, and diseases; treat special hazards or conditions; and provide economic return to the farmer. All crops should be grown in a sequence that will achieve the purpose of the cropping system.

Use of crop residue.—Sufficient crop residue should be left in the field and managed on, or near, the soil surface to furnish protection from erosion, improve tilth, conserve moisture, and increase infiltration. The addition of nitrogen is beneficial if carbonaceous residue is returned to the soil in amounts large enough to prevent release of nitrogen.

Fertilization.—The soils of this survey area are generally low in content of organic matter and in available nitrogen. Phosphorus is needed for alfalfa and most truck and fruit crops. Addition of potassium is generally not needed for low and medium levels of crop production. Iron may be deficient for horticultural crops, fruits, nuts, and specialty crops. The amount of fertilizer needed depends on the crop to be grown, the past cropping history, the level of yield desired, and the kind of soil. It should be based on the results of soil tests or plant tissue tests.

Lining irrigation ditches.—Irrigation field ditches, canals, or laterals can be lined with impervious materials, such as concrete, asphalt, or other durable lining. The principal purposes of lining ditches and canals are to reduce loss of water, prevent waterlogging of the soils, and control erosion. Unlined irrigation field ditches sustain the greatest water loss on Bluepoint, Brazito, and Vinton soils.

Leveling for irrigation.—Land leveling is reshaping the surface of the soil to planned grades. This is done to permit uniform and efficient application of irrigation water without excessive erosion and at the same time provide adequate surface drainage. Deep cuts need to be avoided on the Brazito soils. In this survey area the Bluepoint soils require the greatest reshaping before they can be used for irrigated crops.

Irrigation systems.—Surface and subsurface irrigation systems are installed to efficiently carry and distribute irrigation water to the point of application without excessive erosion or water loss.

Management of irrigation water.—Efficient water management is the use of irrigation water according to the moisture needs of the crop and to achieve optimum crop yields and minimize loss of soil and plant nutrients. It includes the timing of irrigation to meet the moisture needs of the crop, the control and adjustment of the irrigation streamflow to prevent erosion, and the control of the length of irrigation time to reduce water loss.

Permanent pasture and haylands.—Irrigated soils can be managed as pasture or hayland to prolong the life of desirable forage species, to maintain or improve the quality and quantity of forage, and to provide soil protection and reduce water loss.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soil are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat. (None in this survey area.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife habitat, water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-3 or IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Valencia County, Eastern Part are described, and suggestions for the use and management of the soils are given.

Management of irrigated cropland by capability units

In the following pages the capability units for irrigated crops are described, and suggestions for the use and management of the soils are given. The descriptions of the units contain information about the characteristics of the soils in the unit, the present use and suitable management of the soils, and the suitability of the soils for windbreaks.

The names of the soil series represented are given in the description of each unit, but the listing of the series name does not mean that all the soils of that series are in the same capability unit. The capability unit for any given soil can be learned by referring to the "Guide to Mapping Units."

In this survey area, the capability units are set up and numbered within a system of capability classification that is used throughout the land resource area of which this Area is a part. Not all the capability units in this system are applicable, and for this reason the numbering of the capability units is not consecutive in all cases.

CAPABILITY UNIT I-1, IRRIGATED

This unit consists of well-drained soils of the Gila and Glendale series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loam, and this layer is underlain by stratified very fine sandy loam to clay loam. Slopes are dominantly 0 to 1 percent, but areas are included where the slope is 1 to 3 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately slow. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. In areas where the slope is 1 to 3 percent, the erosion hazard is moderate. The available water capacity is 8 to 12 inches. The effective rooting depth is 60 inches or more.

These soils are easy to work. They are used for irrigated alfalfa (fig. 19), small grains, sorghums, row crops, permanent pasture, wildlife habitat, and recreation. Alfalfa, small grains, sorghums, corn, truck crops, orchards, and permanent pasture are well suited.

Row crops can be grown more often in the cropping system if crop residue is left on the soil or if green-manure crops are turned under. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing are needed if surface irrigation systems are used.

The soils of this capability unit can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT I-2, IRRIGATED

This unit consists of well-drained soils of the Gila, Glendale, and Largo series. These soils are on flood plains and terraces. They formed in mixed alluvium. Their surface layer is clay loam or silty clay loam, and this layer is underlain by very fine sandy loam to silty clay loam.

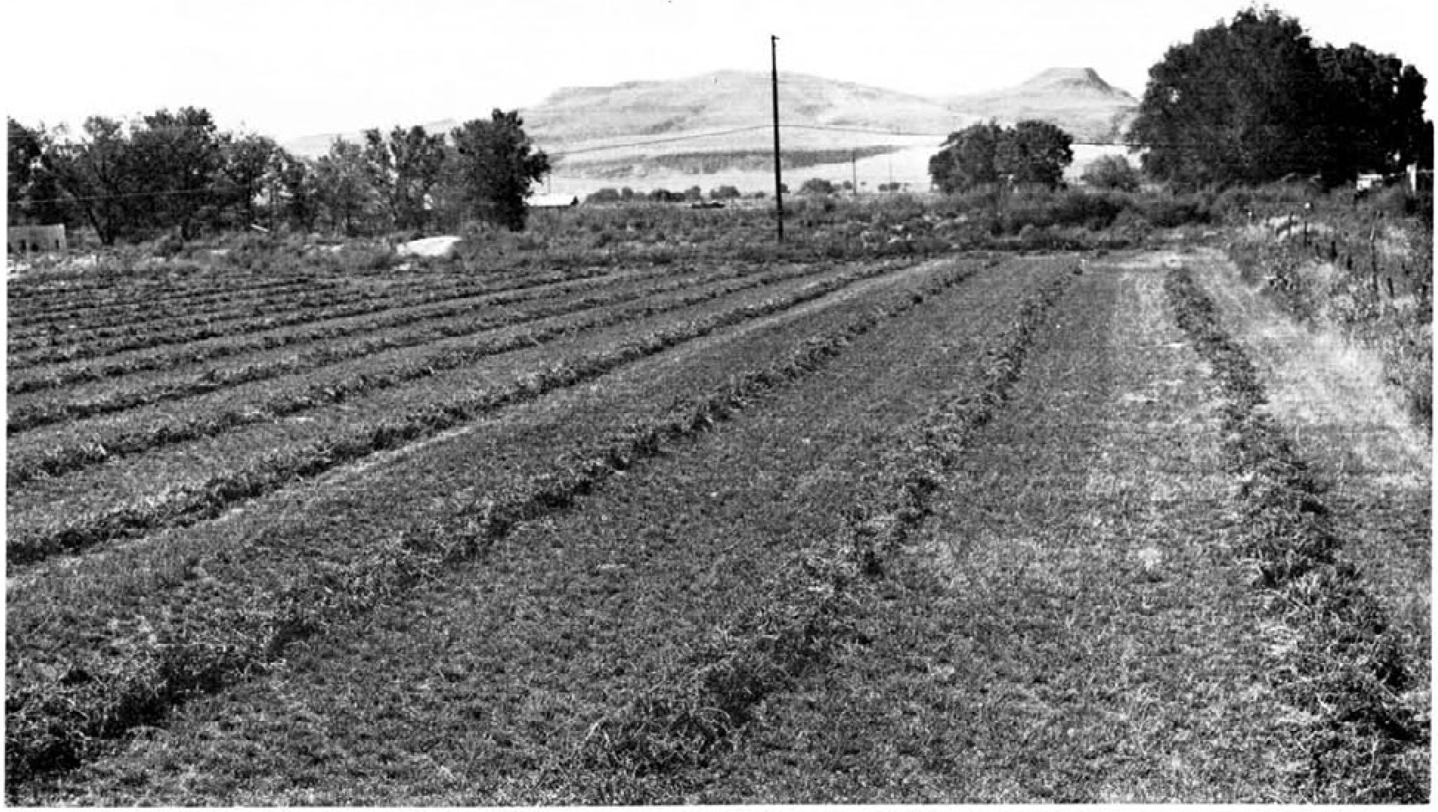

Figure 19.—**A fourth cutting of alfalfa on an area of Glendale loam. Under good management the total annual yield is about 7 tons to the acre. This soil is in capability unit I–1, irrigated.**

Slopes are 0 to 1 percent. Levees protect the soils on flood plains from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 210 days.

Permeability is moderate to moderately slow. Runoff is very slow to slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 8 to 12.5 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for irrigated alfalfa, small grains, row crops, permanent pasture, wildlife habitat, and community development. They are well suited to alfalfa, small grains, sorghums, corn, truck crops, orchards, permanent pasture, and wildlife habitat.

Cropping systems that include soil-improving crops are needed to maintain good tilth. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. The surface layer of the soils is easily compacted when wet, and tillage must be timed to prevent clodding. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Care is needed to prevent scalding or drowning out of crops.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIe–1, IRRIGATED

This unit consists of well-drained soils of the Gila series and the loamy subsoil variant of the Vinton series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loamy fine sand, and this layer is underlain by stratified loam to loamy fine sand. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately rapid in the upper part of the soils and moderately slow to moderate in the lower part. Runoff is very slow. The available water capacity is 7 to 9 inches. The effective rooting depth is 60 inches or more. The hazard of soil blowing is moderate if plant cover is not maintained. A perched water table can form in the Vinton soil if too much irrigation water is applied.

The soils of this unit are used for unimproved native pasture, irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, truck crops, orchards, permanent pasture, wildlife habitat, and community development.

Cropping systems that include soil-improving crops at least 1 year out of 3 help to control erosion. Returning crop residue to the soil helps to maintain the organic-matter content and soil structure and to reduce the erosion hazard. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are needed if surface irrigation systems are used.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIe-3, IRRIGATED

This unit consists only of Largo loam, a well-drained soil on alluvial fans. This soil formed in mixed alluvium. Its surface layer is loam, and this layer is underlain by silty clay loam. Slopes are 1 to 3 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 170 to 210 days.

Permeability is moderately slow to depths of more than 3 feet. Runoff is medium, and the hazard of erosion is moderate if plant cover is not maintained. The available water capacity is 11 to 12.5 inches. The effective rooting depth is 60 inches or more.

This soil is easy to work. The areas are used for irrigated alfalfa, small grains, sorghums, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, corn, truck crops, orchards, permanent pasture, wildlife habitat, and recreation.

Cropping systems that include soil-improving crops at least 1 year out of 3 help to control water erosion. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. This practice also helps to reduce the erosion hazard. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are needed if surface irrigation systems are used. Bench leveling is generally needed for efficient use of irrigation water.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIs-1, IRRIGATED

This unit consists of Agua loam, Vinton loam and Vinton loam, loamy subsoil variant. These are well-drained soils on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loam, and this layer is underlain by fine sandy loam to loamy sand. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately rapid in the upper part of the soils and moderately slow to rapid in the lower part. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 5.5 to 7.5 inches. The effective rooting depth is 20 to 60 inches. A perched water table can form in the Vinton variant soil if too much irrigation water is applied.

These soils are easy to work. They are used for irrigated alfalfa, small grains, row crops, pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, corn, truck crops, orchards, permanent pasture, wildlife habitat, recreation, and community development.

Cropping systems should include soil-improving crops at least 1 year out of 3. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIs-2, IRRIGATED

This unit consists only of Belen loam, a well-drained soil on the flood plain of the Rio Grande. This soil formed in clayey alluvium over loamy alluvium. Its surface layer is loam, and this layer is underlain by clay. Slopes are 0 to 1 percent. Levees protect the soil from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is slow in the upper part of the soil and moderate in the lower part. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 8.5 to 9.5 inches. The effective rooting depth is 60 inches or more.

This soil is easy to work. The areas are used for irrigated alfalfa, small grains, sorghums, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, truck crops, permanent pasture, wildlife habitat, and recreation.

Cropping systems that include soil-improving crops at least 1 year out of 3 help to improve permeability. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIs-3, IRRIGATED

This unit consists of well-drained soils of the Gila and Glendale series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is clay loam to loam, and this layer overlies stratified very fine sandy loam to clay loam. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately slow. The soils are slightly saline and have a seasonal water table at a depth of about 50 inches. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 5 to 7 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for irrigated alfalfa, small grains, sorghums, permanent pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, truck crops, permanent pasture, wildlife habitat, and recreation.

Cropping systems that include soil-improving crops at least 1 year out of 3 give better seed germination. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Drainage to lower the water table and leach out the toxic salts will improve the suitability of these soils for crops.

Thes soils can be used for field and farmstead windbreaks. Suitable salt-tolerant trees and shrubs are Oriental arborvitae, Arizona cypress, Siberian elm, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIs-5, IRRIGATED

This unit consists of well-drained soils of the Agua, Anapra, and Vinton series, and Vinton clay loam, loamy subsoil variant. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is clay loam, and this layer is underlain by clay loam to loamy fine sand. Slopes are 0 to 1 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderately slow to moderately rapid in the upper part of the soils and is moderately slow to rapid in the substrata. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 5 to 7.5 inches. The effective rooting depth is 20 to 60 inches. A perched water table may form in the loamy subsoil variant of the Vinton soils if too much irrigation water is applied.

The soils of this unit are used for irrigated alfalfa, small grains, row crops, pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, corn, truck crops, orchards, permanent pasture, wildlife habitat, recreation, and community development.

Cropping systems that include soil-improving crops at least 1 year out of 3 help to improve tilth. Returning crops residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. All crops respond to commercial fertilizer. These soils are easily compacted when moist. They crack when dry and seal over when wet. Timely tillage is needed to prevent clodding. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Care is needed to prevent scalding or drowning out of crops.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIe-1, IRRIGATED

This unit consists of well-drained to somewhat excessively drained soils of the Bluepoint and Vinton series. These soils are on the flood plain of the Rio Grande and on valley filling fans. They formed in mixed alluvium. Their surface layer is loamy fine sand, and this layer is underlain by loamy fine sand to loamy sand. Slopes are dominantly 0 to 3 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 210 days.

Permeability is moderately rapid to rapid. Runoff is very slow or slow. The hazard of erosion is moderately severe if plant cover is not maintained. The available water capacity is 4 to 6 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for irrigated alfalfa, orchards, community development, and wildlife habitat. They are suited to alfalfa, sorghums, orchards, wildlife habitat, recreation, and community development.

Cropping systems that include soil-improving crops at least 1 year out of 2 help to reduce the erosion hazard. Returning crop residue to the soil helps to maintain the organic-matter content and the soil structure and to reduce the erosion hazard. Nitrogen is needed by most crops, and phosphorus is needed for alfalfa and other legumes. Some crops develop iron chlorosis if the soils are deficient in iron. Iron deficiency can be corrected by adding iron sulfate, acid-forming amendments, or iron chelates. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Bench leveling is generally needed for efficient use of irrigation water on the Bluepoint soil.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIe-2, IRRIGATED

This unit consists only of Bluepoint sandy clay loam, 1 to 3 percent slopes, a somewhat excessively drained soil on valley-filling fans. This soil formed in sandy alluvium. Its surface layer is sandy clay loam, and this layer overlies loamy sand and loamy fine sand.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 210 days.

Permeability is rapid to a depth of more than 3 feet. Runoff is medium, and the hazard of water erosion is moderately severe if plant cover is not maintained. The available water capacity is 4 to 5.5 inches. The effective rooting depth is 60 inches or more.

This soil is easy to work. The areas are used for irrigated alfalfa, orchards, wildlife habitat, and community development. They are suited to alfalfa, small grains, sorghums, truck crops, orchards, permanent pasture, wildlife habitat, recreation, and community development.

Cropping systems that include soil-improving crops at least 1 year out of 2 help to reduce the erosion hazard. Returning crop residue to the soil helps to maintain the organic-matter content and the soil structure and to reduce the erosion hazard. Nitrogen is needed by most crops, and phosphorus is needed for alfalfa and other legumes. Some crops develop iron chlorosis if the soils are deficient in iron. Iron deficiency can be corrected by adding iron sulfate, acid-forming amendments, or iron chelates. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Bench leveling may be needed for efficient use of irrigation water.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIs-2, IRRIGATED

This unit consists only of Brazito sandy clay loam, thick surface, a well-drained soil on the flood plain of the Rio Grande. This soil formed in sandy alluvium. Its surface layer is sandy clay loam, and this layer overlies fine sand. Slopes are 0 to 1 percent. Levees protect the soil from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is rapid to a depth of more than 3 feet. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 4 to 5 inches. The effective rooting depth is 11 to 20 inches.

This soil is used for irrigated alfalfa, permanent pasture, wildlife habitat, and community development. It is suited to alfalfa, permanent pasture, wildlife habitat, recreation, and community development.

Cropping systems should include soil-improving crops at least 1 year out of 2. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Applications of irrigation water should be light and frequent, and irrigation ditches should be lined to prevent seepage of irrigation water. Leveling and smoothing of the soil are needed if surface irrigation systems are used. Deep cuts should be avoided when leveling.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIs-3, IRRIGATED

This unit consists of well-drained soils of the Armijo and Belen series. These are nonsaline to slightly saline soils on the flood plain of the Rio Grande. They formed in clayey alluvium. Their surface layer is clay or clay loam, and this layer overlies clay. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is slow to very slow. Runoff is very slow, and there is a slight hazard of erosion if plant cover is not maintained. The available water capacity is 4 to 9.5 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for irrigated alfalfa, small grains, sorghums, permanent pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, permanent pasture, and wildlife habitat.

Cropping systems that include soil-improving crops at least 1 year out of 2 help to improve tilth. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. These soils become cloddy when worked and are difficult to keep in good tilth. They crack when dry and seal over when wet. Timely tillage is needed to prevent clodding. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Care is needed to prevent scalding or drowning out of crops.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIs-4, IRRIGATED

This unit consists of well-drained soils of the Agua and Vinton series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loam or loamy fine sand, and this layer overlies fine sandy loam to loamy fine sand. Slopes are 0 to 1 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately rapid in the upper part of the soils and is moderately rapid to rapid in the substrata. These soils are slightly saline and have a seasonal water table at a depth of about 48 inches. Crusts of white salts are common on the surface. Runoff is very slow, and there is a slight to moderate hazard of erosion if plant cover is not maintained. The available water capacity is 4 to 6 inches. The effective rooting depth is 20 to 60 inches.

The soils of this unit are used for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. They are suited to alfalfa, small grains, sorghums, permanent pasture, wildlife habitat, and recreation.

Cropping systems that include soil-improving crops at least 1 year out of 2 help to reduce the effect of the salts. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate, and to improve seed germination. Nitrogen is needed for most crops, and phosphorus is needed for alfalfa and other legumes. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Suitability of these soils for crops can be improved by establishing artificial drains and then leaching to remove excess salts.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, Siberian elm, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IIIs-5, IRRIGATED

This unit consists of well-drained soils of the Agua, Gila, and Vinton series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is clay loam to loamy fine sand, and this layer overlies stratified very fine sandy loam to loamy fine sand. Slopes are 0 to 1 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately rapid. These soils are affected by alkali in about 35 percent of the acreage, and in these places they are not suitable for most crops. They are dispersed and crust easily. Runoff is very slow, and there is a slight to moderate hazard of erosion if plant cover is not maintained. The available water capacity is 4 to 7 inches. The effective rooting depth is 20 to 60 inches.

The soils of this unit are used for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. They are suited to alfalfa, barley, permanent pasture, wildlife habitat, and recreation.

Cropping systems that include soil-improving crops at least 1 year out of 2 give better seed germination. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, the tilth, and the water intake rate. All crops respond to commercial fertilizer. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Suitability of these alkali soils can be improved by adding gypsum or chemical amendments and then leaching out the alkali (sodium).

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Oriental arborvitae, Arizona cypress, mulberry, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVe-1, IRRIGATED

This unit consists only of Brazito loamy fine sand, a well-drained soil on the flood plain of the Rio Grande. This soil formed in sandy aluvium. Its surface layer is loamy fine sand, and this layer overlies sand. Slopes are 0 to 1 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is rapid. Runoff is very slow, and the hazard of erosion is severe if plant cover is not maintained. The available water capacity is 3 to 3.75 inches. The effective rooting depth is 4 to 16 inches.

This soil is droughty. The areas are used for irrigated alfalfa, small grains, permanent pasture, and wildlife habitat. They are suited to alfalfa, small grains, permanent pasture, and wildlife habitat.

Cropping systems that include soil-improving crops at least 2 years out of 3 help to reduce soil blowing. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and to reduce the erosion hazard. All crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Applications of irrigation water should be light and frequent, and irrigation ditches should be lined to prevent seepage of irrigation water. Leveling and smoothing of the soils are required if surface irrigation systems are used. Deep cuts should be avoided when leveling.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Arizona cypress, Siberian elm, Russian-olive, and skunkbush sumac. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVw-1, IRRIGATED

This unit consists only of Brazito sandy clay loam, thick surface, moderately saline. This is a well-drained soil on the flood plain of the Rio Grande. The soil formed in sandy alluvium. It has a surface layer of sandy clay loam, and this layer overlies sand. Slopes are 0 to 1 percent.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is rapid in the underlying layers. This soil has a seasonal water table at a depth of about 30 inches. It is moderately saline, and crusts of salts form on the surface. Runoff is very slow, and the hazard of erosion is slight if plant cover is not maintained. The available water capacity is 3 to 3.75 inches. The effective rooting depth is 11 to 16 inches.

This soil is used for native pasture and wildlife habitat. It is suited to permanent pasture, native pasture, and wildlife habitat.

Cropping systems should include soil-improving crops every year. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and improve seed germination. Most crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Deep cuts should be avoided when leveling. The areas can be improved by artificial drainage and then leaching to remove excess salts.

This soil can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Russian-olive and Oriental arborvitae. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVs-1, IRRIGATED

This unit consists only of Brazito soils, moderately alkali. These are well-drained soils on the flood plain of the Rio Grande. They formed in sandy alluvium and are underlain by sand. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is rapid to a depth of more than 3 feet. These soils contain moderate amounts of alkali in about 35 percent of the acreage, and in these places they are not suitable for most crops. They are dispersed and crust easily, and movement of air and water is restricted. Runoff is very slow, and the hazard of erosion is moderate to severe if plant cover is not maintained. The available water capacity is 3 to 3.75 inches. The effective rooting depth is 4 to 16 inches.

The soils of this unit are used for unimproved native pasture, wildlife habitat, and irrigated pasture. They are suited to alfalfa, permanent pasture, wildlife habitat, and recreation.

Cropping systems should include soil-improving crops every year. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. All crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Suitability of these alkali soils can be improved by adding gypsum or chemical amendments and then leaching out the alkali (sodium).

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Russian-olive, skunkbush sumac, and Arizona cypress. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVs-3, IRRIGATED

This unit consists of well-drained soils of the Gila and Vinton series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loam, and this layer overlies stratified very fine sandy loam to loamy fine sand. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately rapid. These soils are moderately to strongly saline and have a seasonal water table at a depth of about 48 inches. Crusts of white salts are on the surface. The soils contain moderate amounts of alkali in about 50 percent of the acreage, and in these places they are not suitable for most crops. They are dispersed and crust easily (fig. 20), and movement of air and water is restricted. Runoff is

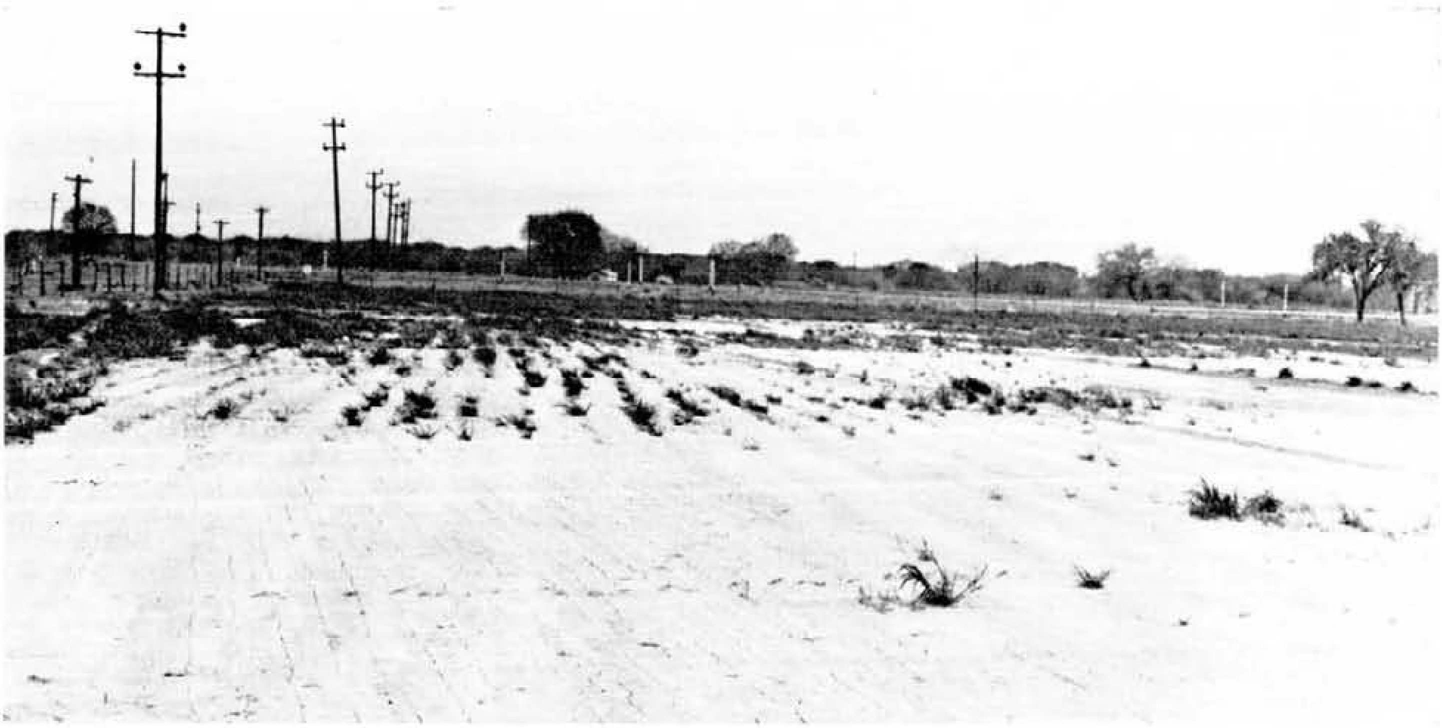

***Figure 20.*—An area of Gila loam, strongly saline and alkali. This soil is dispersed and crusts easily. The alfalfa crop in this field has failed completely. This soil is in capability unit IVs–3, irrigated.**

very slow, and the hazard of erosion is slight if plant cover is not maintained. The available water capacity is 3 to 7 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for irrigated alfalfa, small grains, permanent pasture, native pasture, and wildlife habitat. They are suited to alfalfa, barley, permanent pasture, wildlife habitat, and recreation.

Cropping systems should include soil-improving crops every year. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Most crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Drainage to lower the water table is an essential part of management to improve suitability of the soils for crops. Drainage, use of gypsum or chemical amendments, and leaching out the salts and alkali (sodium) will improve the suitability of these soils for crops.

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Russian-olive and Oriental arborvitae. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVs–4, IRRIGATED

This unit consists of well-drained soils of the Gila and Glendale series. These soils are on the flood plain of the Rio Grande. They formed in mixed alluvium. Their surface layer is loam to loamy fine sand, and this layer overlies stratified very fine sandy loam to clay loam. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is moderate to moderately slow. These soils are strongly alkali in about 50 percent of the acreage, and in these places they are not suitable for most crops. They are dispersed and crust easily, and movement of air and water is restricted. Crop failure is common. Runoff is very slow, and there is a slight to moderate hazard of erosion if plant cover is not maintained. The available water capacity is 5 to 7 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for unimproved native pasture, alfalfa, small grains, permanent pasture, and wildlife habitat. They are suited to alfalfa, permanent pasture, wildlife habitat, and recreation.

Cropping systems should include soil-improving crops every year. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Most crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. Suitability of these alkali soils can be improved by adding gypsum or chemical amendments and then leaching out the alkali (sodium).

These soils can be used for field and farmstead windbreaks. Suitable trees and shrubs for windbreaks are Russian-olive and Oriental arborvitae. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

CAPABILITY UNIT IVs-5, IRRIGATED

This unit consists of well-drained soils of the Armijo and Belen series. These soils are on the flood plain of the Rio Grande. They formed in clayey alluvium. Their surface layer is loam or clay loam, and this layer is underlain by clay. The soils are commonly slightly to moderately saline. Slopes are 0 to 1 percent. Levees protect the soils from flooding.

The average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 185 days.

Permeability is slow to very slow in the upper part of the soils and is very slow to moderate in the lower part. The soils have moderate amounts of alkali in about 25 to 35 percent of the acreage, and in these places they are not suited to most crops. They are dispersed and crust easily, and the movement of air and water is restricted. Runoff is very slow, and the hazard of erosion is slight if plant cover is not maintained. The available water capacity is 2.5 to 3 inches. The effective rooting depth is 60 inches or more.

The soils of this unit are used for unimproved native pasture, alfalfa, small grains, and permanent pasture. They are suited to alfalfa, permanent pasture, and wildlife habitat.

Cropping systems should include soil-improving crops every year. Returning crop residue to the soil helps to maintain the organic-matter content, the soil structure, and the water intake rate. Most crops respond to nitrogen and phosphorus. Both mechanical and chemical methods are used to control annual and perennial weeds.

An efficient irrigation system and good management of irrigation water are needed for optimum production. Leveling and smoothing of the soils are required if surface irrigation systems are used. These soils are difficult to improve because of their clayey subsoil. Artificial drainage, use of gypsum and chemical amendments, and leaching are essential if suitability of the soils for crops is to be improved.

These soils can be used for field and farmstead windbreaks. Russian-olive is a suitable shrub for windbreaks. Irrigation is required to establish and maintain windbreaks. Trees and shrubs in windbreaks must be protected from grazing and burning.

Estimated yields of crops on irrigated soils

Table 2 gives the estimated average yields per acre, on arable soils, of the principal crops that are grown under irrigation in the survey area. The estimates are based on the experience of farmers and on observations made by the county extension agent and representatives of the agricultural experiment station and the local offices of the Soil Conservation Service.

The yield data in the table are for a moderately high level of management. Such management includes crop rotations planned to effect soil improvement; return of crop residue to the soil; a balanced program of fertilization to meet the needs of the crop to be grown; planting suitable kinds of crops; the use of good-quality seed; the control of weeds, insects, and disease; and the efficient use of irrigation water. This level of management also includes erosion-control measures, drainage, and reduction of toxic salts where needed.

TABLE 2.—*Estimated average yields per acre of principal crops on irrigated soils*

[Yields are those to be expected under a moderately high level of management. Absence of a yield figure indicates that the crop is not suited to the soil or is not commonly grown on it. Only arable soils are listed in this table]

Soil	Alfalfa	Barley	Corn or sorghum for silage	Sorghum for grain	Winter wheat	Green chili	Lettuce	Tame pasture
	Tons	*Bu*	*Tons*	*Lb*	*Bu*	*Cwt*	*Cwt*	*AUM*[1]
Agua clay loam	7. 0	87. 0	23. 0	6, 900	60. 0	150	280	19
Agua loam	7. 0	87. 0	24. 0	7, 250	60. 0	155	290	20
Agua loam, moderately alkali	5. 0	60. 0	16. 5		41. 0			14
Agua loam, slightly saline	5. 2	64. 0	18. 0	5, 450	44. 0			15
Anapra clay loam	7. 0	87. 0	22. 0		59. 0			19
Armijo clay, slightly saline	4. 0	64. 0			40. 0			10
Armijo loam, moderately alkali	2. 8	45. 0			28. 0			7
Belen clay loam	4. 5	71. 0	15. 5		49. 0			12
Belen clay loam, moderately alkali	3. 1	35. 0			34. 0			8. 5
Belen loam	6. 5	65. 0	21. 5		59. 0			18
Bluepoint loamy fine sand, 1 to 3 percent slopes	6. 0							15

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of principal crops on irrigated soils*—Continued

Soil	Alfalfa	Barley	Corn or sorghum for silage	Sorghum for grain	Winter wheat	Green chili	Lettuce	Tame pasture
	Tons	*Bu*	*Tons*	*Lb*	*Bu*	*Cwt*	*Cwt*	*AUM*[1]
Bluepoint sandy clay loam, 1 to 3 percent slopes	6.5	78.0	20.0	----------	54.0	----------	----------	17
Brazito loamy fine sand	5.0	----------	----------	----------	----------	----------	----------	12
Brazito soils, moderately alkali	4.0	51.0	----------	----------	----------	----------	----------	11
Brazito sandy clay loam, thick surface	6.0	74.0	19.5	5,950	50.0	----------	----------	13
Brazito sandy clay loam, thick surface, moderately saline	4.0	51.0	13.5	----------	35.0	----------	----------	11
Gila clay loam	8.0	100.0	26.0	7,900	69.0	170	310	20
Gila clay loam, slightly saline	6.0	74.0	19.5	5,950	50.0	125	230	15
Gila clay loam, moderately alkali	5.5	70.0	----------	5,450	48.0	----------	----------	14
Gila loam	8.0	100.0	28.0	8,500	69.0	180	330	22
Gila loam, slightly saline	6.0	74.0	21.0	6,350	50.0	135	250	16.5
Gila loam, strongly alkali	4.5	64.0	16.5	----------	40.0	----------	----------	13
Gila loam, strongly saline and alkali	4.0	57.0	----------	----------	35.0	----------	----------	12
Gila loam, moderately alkali	5.5	71.0	19.0	5,950	48.0	125	230	15.5
Gila loamy fine sand	7.0	----------	----------	7,250	----------	150	250	20
Gila loamy fine sand, strongly alkali	4.0	----------	----------	4,350	----------	----------	----------	12
Glendale clay loam	7.0	93.0	24.0	7,250	65.0	160	290	20
Glendale loam	7.5	93.0	26.0	7,900	65.0	170	310	20
Glendale loam, strongly alkali	4.5	51.0	----------	----------	38.0	----------	----------	12
Glendale soils, slightly saline	5.2	65.0	18.0	----------	45.0	----------	----------	14
Largo loam	7.0	87.0	----------	----------	59.0	----------	----------	19
Largo silty clay loam	7.0	91.0	----------	----------	62.0	----------	----------	20
Vinton clay loam	7.0	87.0	23.0	6,050	60.0	----------	----------	17.5
Vinton loam	7.0	87.0	23.5	6,550	61.0	150	280	18
Vinton loam, moderately saline and alkali	3.8	50.0	----------	----------	34.0	----------	----------	10.5
Vinton loamy fine sand	6.0	----------	----------	----------	----------	120	----------	17
Vinton loamy fine sand, slightly saline	4.5	----------	----------	----------	----------	----------	----------	12.5
Vinton loamy fine sand, moderately alkali	4.3	----------	----------	----------	----------	----------	----------	12
Vinton loam, slightly saline	5.2	68.0	17.5	----------	46.0	----------	----------	13.5
Vinton loamy fine sand, loamy subsoil variant	6.2	----------	----------	----------	----------	140	----------	17.2
Vinton loam, loamy subsoil variant	7.3	88.0	24.5	6,800	64.0	160	295	20
Vinton clay loam, loamy subsoil variant	7.0	88.0	23.5	6,300	61.0	----------	----------	17.5

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[1] AUM stands for animal-unit-month, a term used to express the carrying capacity of pasture. It is the number of animal units per acre multiplied by the number of months the pasture can be grazed during a single grazing season without injury to the sod. An acre of pasture that provides 7 months of grazing for 2 cows has a carrying capacity of 14 animal-unit-months.

Dryland Capability Classification

In this survey area the soils are grouped at two levels of dryland capability classification: the capability class and the subclass. The dryland capability subclass is shown at the end of the soil descriptions for the soils used for range or dryland crops.

The dryland subclasses used in this survey area are as follows:

- Subclass VIe. Soils that are generally unsuited to cultivation or are severely limited, chiefly because of risk of erosion, if protective cover is not maintained.
- Subclass VIs. Soils that are generally unsuited to cultivation and are restricted for other uses by limited water capacity, gravel, or fine texture.
- Subclass VIIe. Soils that are unsuited to cultivation or are very severely limited, chiefly because of risk of erosion, if protective cover is not maintained.
- Subclass VIIw. Soils that are unsuited to cultivation or are very severely limited, chiefly because of risk of flooding and a high water table.
- Subclass VIIs. Soils that are unsuited to cultivation or are very severely limited, chiefly because of shallowness, stones, alkali, or other soil features.
- Subclass VIIc. Soils that are unsuited to cultivation or are very severely limited, chiefly because of the dry climate.
- Subclass VIIIe. Landforms that have little potential for plants chiefly because of the hazard of excessive erosion.
- Subclass VIIIw. Landforms that have little potential for vegetation chiefly because of the risk of flooding and the erosion hazard.
- Subclass VIIIs. Land types that consist mainly of rock or other material that has little potential for plant use.

Range Management[3]

The grazing of livestock is the principal use of the soils in the survey area. Rangeland makes up about 490,000 acres, or nearly 90 percent. The use of the range for grazing livestock is a major source of income.

The rangeland is on mesas and piedmonts, both east and west of the Rio Grande valley. The soil texture ranges from clay to fine sand; in some places the soils contain gravel or stones.

Cattle are the chief livestock grazed. Ranch operations range from cow-calf breeding ranches to summer grazing of yearlings. Horses for ranch use are also common on the range.

Good range management contributes to the successful operation of a ranch. The information in this section can be used to identify range sites, to evaluate the present range condition, and to estimate the production of a range site.

Rangeland is land on which the natural potential plant community consists principally of native grasses, forbs, and shrubs suitable for grazing and in sufficient quantity to justify use of the soils for grazing.

Effective range management requires knowledge of the capabilities of the different kinds of soils and the kinds and amounts of forage that can be produced. It also requires the ability to evaluate the present condition of the range vegetation in relation to its potential for production.

A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce certain kinds and amounts of native plants. The productive capacity of a range site depends on the combined effect of the soils and climate that are characteristic of the particular site. The range site retains its capacity to produce its potential plant community so long as the environment is not changed.

Land resource areas

A land resource area is a geographic area characterized by a particular combination or pattern of soils, climate, elevation, and topography. These variations result in differing kinds of rangeland.

The survey area includes parts of three major land resource areas. These are identified as CP (Pecos-Canadian Plains and Valleys), SD (Southern Desertic Basins, Plains, and Mountains), and WP (New Mexico Plateaus and Mesas).

The Pecos-Canadian Plains and Valleys land resource area is in the southeastern corner of the survey area. The areas are on the eastern slopes of the Manzano Mountains and the adjacent alluvial fans. They consist of mountain slopes, deep canyons, and gently sloping to steep fans. The soils are mainly shallow or moderately deep to bedrock. They are stony, and rock outcrops are numerous. Elevations range from 5,800 to 8,000 feet. The average annual air temperature is 50° to 57° F., and the average annual precipitation is 10 to 14 inches. The frost-free season is 125 to 185 days. Snow has lain on the ground as long as 2 months in some years.

The Southern Desertic Basins, Plains, and Mountains land resource area covers 91 percent of the survey area. It consists of broad piedmonts and mesas, the Rio Grande and Rio Puerco valleys, rolling gravelly terraces along the edges of the valleys, and scattered volcanic mountains and mesas. The soils are mainly deep to bedrock; they formed in alluvium and wind-laid material. Elevations range from about 4,750 to 6,000 feet. The average annual air temperature is 54° to 60° F., and the average annual precipitation is 7 to 10 inches. The frost-free season is 165 to 210 days. Snow cover seldom lasts more than 3 or 4 days. One-seed juniper grows only in the extreme western part of the land resource area.

The New Mexico Plateaus and Mesas land resource area is along the eastern boundary of the survey area and in the northwestern corner. The areas include the western slopes of the Manzano Mountains, the adjacent alluvial fans, and slopes along Mesa Carrizo. They consist of mountain slopes, rolling sandstone ridges, and gently sloping to strongly sloping alluvial fans. The soils are shallow to deep to bedrock and are gravelly or stony. Rock crops out on the mountain slopes. Elevations range from 5,500 to 8,000 feet. The average annual air temperature is 50° to 54° F., and the average annual precipitation is 9 to 14 inches. The frost-free season is 125 to 170 days. Snow cover may last 2 or 3 weeks.

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[3] DONALD R. ROBERTSON and DANIEL L. MERKEL, range conservationists, Soil Conservation Service, assisted in preparation of this section.

Prairie junegrass, Scribner needlegrass, needleandthread, pinyon pine, and one-seed juniper are common in the Pecos-Canadian Plains and Valleys land resource area. Only scattered one-seed juniper and only a few pinyon pines grow in the New Mexico Plateaus and Mesas land resource area. Indian ricegrass, burrograss, sand sagebrush, broom dalea, common mesquite, and Russianthistle grow mainly in the Southern Desertic Basins, Plains, and Mountains land resource area.

Range condition classes

Range condition refers to the composition of the existing native vegetation on a given site in relation to what the site is capable of producing. It is expressed in terms of condition classes. The condition class represents the degree to which the existing plant community is different from that of the potential plant community. The primary purpose of determining range condition is to provide a basis for predicting the nature and direction of vegetative changes to be expected from management and treatment measures.

A range site is in excellent condition if 76 to 100 percent of the present vegetation is of the same kind as the potential plant community for the site. It is in good condition if the percentage is between 51 and 75, in fair condition if the percentage is between 26 and 50, and in poor condition if the percentage is 25 or less.

The plants on a given site are grouped, according to their response to grazing, as decreasers, increasers, and invaders. Decreasers are plants in the potential plant community that tend to die out if they are heavily grazed. These plants are generally the most palatable. Increasers are plants in the potential plant community that become more abundant as the decreasers decline. Not all increasers respond to grazing in the same way. Some plants of moderately high grazing preference may increase at first and later decrease as grazing pressure continues. Others of low grazing preference continue to increase and can dominate the range site under prolonged excessive grazing. Invaders are plants that are not part of the potential plant community but that become established if both the decreasers and the increasers decline. The forage value and relative grazing preference of invaders varies from high to low.

Descriptions of range sites

Each range site in the survey area is briefly described in the following pages. Each description gives significant soil characteristics that influence the kinds of plants that grow on the site, lists the important decreaser and increaser plants and the plants that are dominant when the range is in poor condition, and gives estimates of yields that can be expected. The total annual production is given in pounds per acre, air dry, of all plants on the range site, including those that have no value for domestic livestock. The estimated total annual yields of plants that provide forage for cattle are also given for each site.

The following miscellaneous land types are not included in range sites, because they are not suitable for grazing: Badland, Gullied land, Riverwash, and Rock outcrop and Landslides. Soils used for irrigated crops have not been placed in range sites, because they are managed primarily as irrigated cropland or tame pasture.

The names of the soil series represented are given in the description of each range site, but the listing of the series name does not mean that all the soils of that series are in the same range site. The range site for any given soil can be learned by referring to the "Guide to Mapping Units."

BREAKS CP RANGE SITE

This range site consists of well-drained soils of the Deama and Laporte series and of Rock land (fig. 21). The soils have a surface layer of gravelly loam and are underlain by gravelly loam or very gravelly loam. They are very shallow to shallow over bedrock. Slopes are 15 to 80 percent. Elevations range from 6,000 to 7,000 feet.

Permeability is moderate. Runoff is rapid. The average annual precipitation is 10 to 14 inches.

If this site is in excellent condition, decreasers make up at least 50 percent of the vegetation. Scribner needlegrass, Metcalfe muhly, side-oats grama, black grama, needleandthread, bush muhly, cane bluestem, and wolftail are the main decreaser plants. Blue grama, hairy grama, sand dropseed, and galleta are the main increasers. Less abundant increasers are scattered one-seed juniper, pinyon pine, mountainmahogany, skunkbush sumac, beargrass, shrub live oak, and Apache-plume. Increasers make up as much as 50 percent of the vegetation.

If this site is in poor condition, the vegetation is mainly one-seed juniper, pinyon pine, mountainmahogany, shrub live oak, beargrass, and skunkbush sumac. The understory is blue grama, hairy grama, sand dropseed, galleta, three-awn, and tridens.

The soils of this range site are not suitable for windbreaks, because they are too shallow to provide adequate rooting depth.

If this range site is in excellent condition, the annual yield of all plants is 800 pounds per acre, air dry, in moist years and 200 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 600 pounds per acre, air dry, in moist years and 150 pounds per acre in dry years.

BREAKS SD RANGE SITE

This site consists only of the Akela part of Rock outcrop-Akela complex, 10 to 50 percent slopes. The areas are on volcanic mountains in the western part of the survey area. The soil is well-drained, very shallow to shallow gravelly sandy loam and very gravelly sandy loam. It overlies basalt bedrock. Elevations range from 5,000 to 6,000 feet.

Permeability is moderate. Runoff is rapid. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up at least 50 percent of the vegetation. Black grama, blue grama, side-oats grama, hairy grama, bush muhly, and winterfat are the main decreaser plants. Fourwing saltbush, sand dropseed, galleta, tridens, three-awn, and one-seed juniper are important increasers.

The vegetation on this site is seldom reduced to poor condition because the soil is steep and gravelly and, consequently, grazing use is limited.

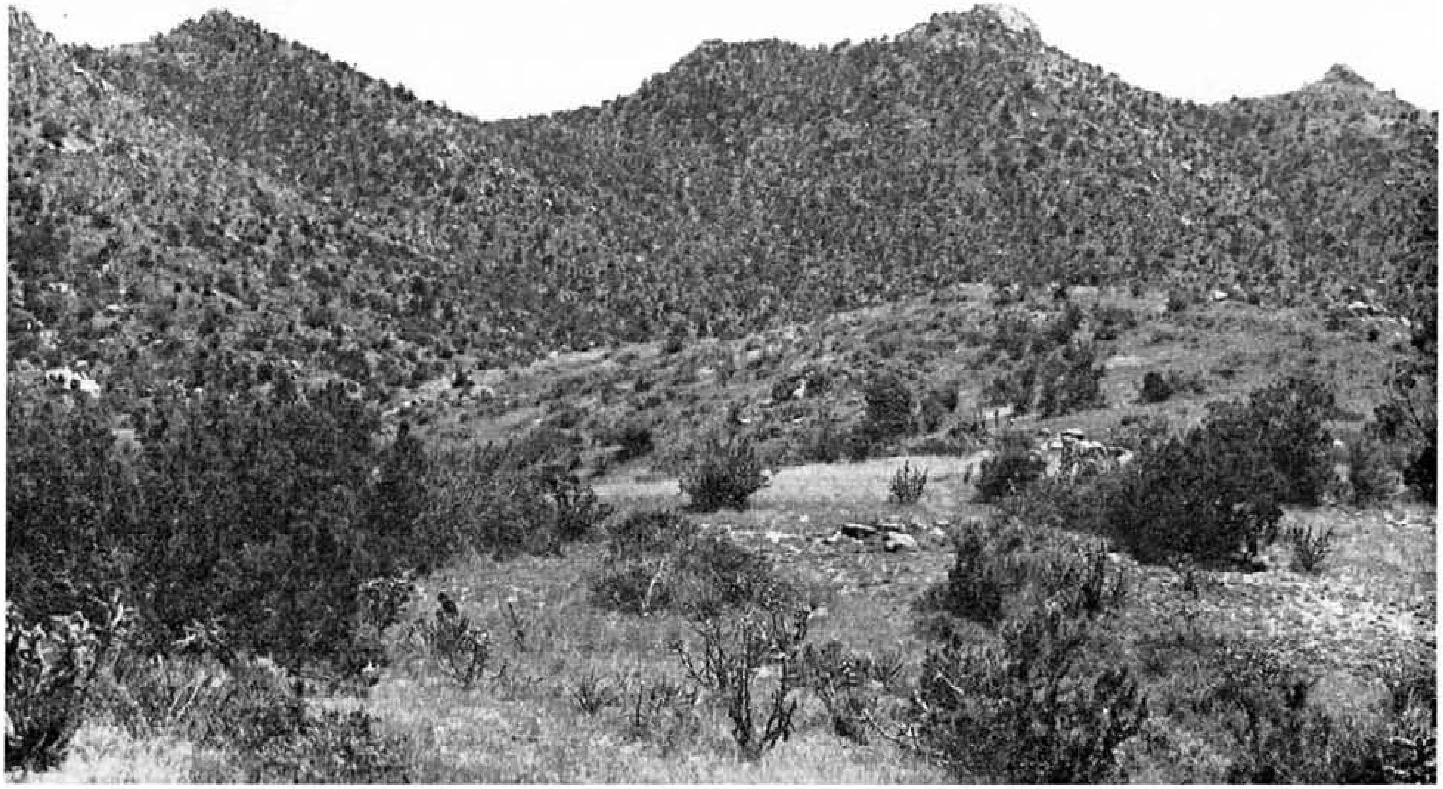

Figure 21.—**The area of Rock land in the background is in Breaks CP range site. The soil in the foreground is Santa Fe very stony loam, 25 to 70 percent slopes, which is in Hills CP range site.**

The soil in this range site is not suitable for windbreaks, because it is too shallow to provide adequate rooting depth.

If this range site is in excellent condition, the total annual yield of all plants is 600 pounds per acre, air dry, in moist years and 250 pounds in dry years. The estimated annual yield of species that provide forage for cattle is 450 pounds per acre, air dry, in moist years and 200 pounds in dry years.

DEEP SAND SD RANGE SITE

This range site consists of deep, well-drained to somewhat excessively drained soils of the Bluepoint, Madurez, Pajarito, and Wink series. These soils have a thick surface layer of loamy sand or loamy fine sand and are underlain by loamy sand to sandy clay loam. Slopes are 0 to 9 percent. Elevations range from 4,800 to 5,700 feet.

Permeability is moderate to rapid. Runoff is slow. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up 65 percent of the vegetation. Indian ricegrass, black grama, and giant dropseed are the main decreaser plants. Less abundant decreasers are blue grama, bush muhly, fourwing saltbush, and winterfat. Galleta, mesa dropseed, sand dropseed, spike dropseed, and sand sagebrush are the main increasers. Less abundant increasers are broom dalea, Mormon-tea, small soapweed (yucca), and broom snakeweed.

If this site is in poor condition, the vegetation is generally sand sagebrush, broom snakeweed, and tumbleweed. If the plant cover is greatly reduced, the soils of this site are subject to extensive damage from soil blowing.

Chemical control of sand sagebrush is feasible if the soils have a good understory of grass. The soils are suitable for field and farmstead windbreaks. Such trees and shrubs as Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac are well suited. Irrigation is essential while the young trees and shrubs are becoming established and for maintenance after they are established. The windbreaks need protection from grazing and burning.

If this range site is in excellent condition, the annual yield of all plants is 1,150 pounds per acre, air dry, in moist years and 400 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 925 pounds per acre, air dry, in moist years and 300 pounds per acre in dry years.

GRAVELLY WP RANGE SITE

This range site (fig. 22) consists of well-drained to somewhat excessively drained soils of the Ildefonso, Millett, Salas, Sedillo, and Tesajo series. These soils have a surface layer of loam to very stony loam or stony sandy loam and are underlain by very gravelly sandy loam to

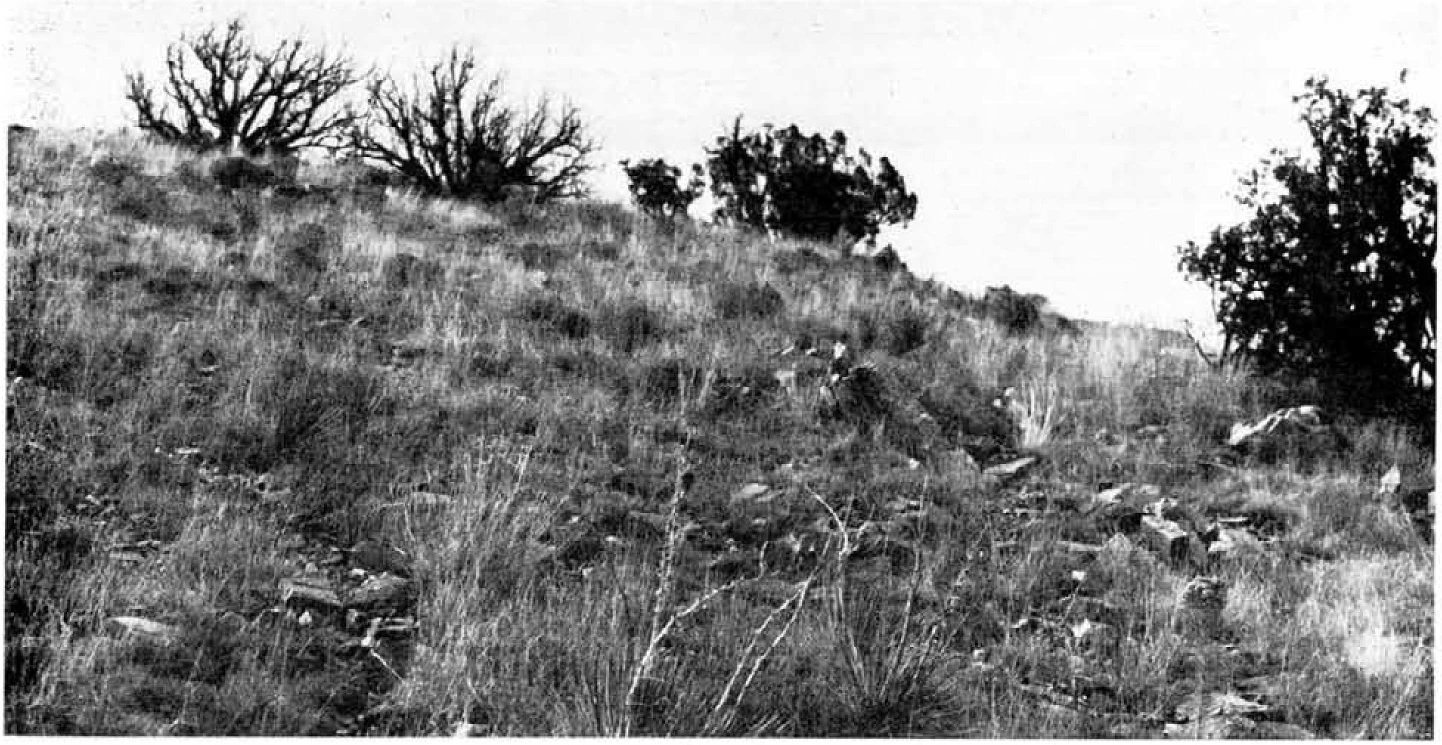

Figure 22.—An area of Gravelly WP range site. The soil is Salas very stony loam, 30 to 70 percent slopes. The vegetation on this site is mainly black grama, blue grama, Scribner needlegrass, side-oats grama, bush muhly, sand dropseed, and scattered one-seed juniper and small soapweed.

very gravelly clay loam. Slopes are 1 to 70 percent. Elevations range from 5,500 to 7,500 feet.

Permeability is moderate to rapid. Runoff is medium to rapid. The average annual precipitation is 9 to 14 inches.

If this site is in excellent condition, decreasers make up at least 70 percent of the vegetation. Black grama, blue grama, side-oats grama, Scribner needlegrass, hairy grama, and bush muhly are the main decreaser plants. Increasers make up as much as 30 percent of the vegetation. Sand dropseed, galleta, ring muhly, skunkbush sumac, small soapweed (yucca), beargrass, cactus, and scattered one-seed juniper are the main increasers. At the higher elevations the increasers may include mountain-mahogany, shrub live oak, Gambel oak, and scattered ponderosa pine.

If this site is in poor condition, the vegetation is mainly galleta, sand dropseed, ring muhly, three-awn, wolftail, beargrass, small soapweed (yucca), broom snakeweed, cactus, and one-seed juniper.

The soils of this site are too gravelly to be suitable for windbreaks. Only Sedillo very gravelly loam, 3 to 9 percent slopes, and the soils of the Millett- Tesajo association are suitable for reseeding and mechanical brush control.

If this range site is in excellent condition, the total annual yield of all plants is 1,200 pounds per acre, air dry, in moist years and 200 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 900 pounds per acre, air dry, in moist years and 150 pounds per acre in dry years.

HILLS CP RANGE SITE

This range site consists only of Santa Fe very stony loam, 25 to 70 percent slopes. This soil is well drained. It has a surface layer of very stony loam and a subsoil of very gravelly clay loam. Elevations range from 6,000 to 8,000 feet.

Permeability is moderate. Runoff is rapid. The average annual precipitation is 10 to 14 inches.

If this site is in excellent condition, decreasers make up at least 50 percent of the vegetation. Side-oats grama, prairie junegrass, and mountainmahogany are the main decreaser plants. Increasers make up about 50 percent of the vegetation. Blue grama, hairy grama, and ring muhly are the main increaser plants. About 30 percent of the increasers consists of pinyon pine, one-seed juniper, shrub live oak, Gambel oak, Apache-plume, Spanish-dagger, cholla, and skunkbush sumac.

If this site is in poor condition, the vegetation is mainly pinyon pine, one-seed juniper, shrub live oak, Gambel oak, Apache-plume, Spanish-dagger, cholla, and skunkbush sumac. The understory is blue grama, hairy grama, and ring muhly.

The soils in this site are too shallow and gravelly to be suitable for windbreaks.

If this range site is in excellent condition, the total annual yield of all plants is 700 pounds per acre, air dry, in moist years and 150 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 490 pounds per acre, air dry, in moist years and 100 pounds per acre in dry years.

LIMY SD RANGE SITE

This range site consists only of the Nickel part of Nickel-Latene association, rolling. This soil is well drained. It has a surface layer of gravelly fine sandy loam that is underlain by gravelly loam. A strong layer of very gravelly lime occurs at depths of 10 to 20 inches. Slopes are 5 to 25 percent. Elevations range from 5,400 to 6,000 feet.

Permeability is moderately slow. Runoff is rapid. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up 60 percent of the vegetation. Black grama, blue grama, and winterfat are the main decreaser plants. Less abundant decreasers are bush muhly, hairy grama, and sideoats grama. Galleta and sand dropseed are the main increaser plants. Less abundant increasers are burrograss, three-awn, fluffgrass, small soapweed (yucca), tridens, and ring muhly.

If this site is in poor condition, the soils are generally covered with broom snakeweed, Russian-thistle, cactus, creosotebush, fluffgrass, and burrograss.

The soils in this site are too shallow to a lime layer to be suitable for windbreaks.

If this range site is in excellent condition, the total annual yield of all plants is about 550 pounds per acre, air dry, in moist years and 225 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 475 pounds per acre, air dry, in moist years and about 200 pounds per acre in dry years.

LOAMY CP RANGE SITE

This range site consists of well-drained soils of the Dean and Hassell series. These soils have a loam surface layer that is underlain by gravelly loam or heavy clay loam. Slopes are 2 to 7 percent. Elevations range from 5,800 to 6,300 feet.

Permeability is slow. Runoff is medium. The average annual precipitation is 10 to 14 inches.

If this site is in excellent condition, decreasers make up at least 50 percent of the vegetation. Black grama, bush muhly, winterfat, and fourwing saltbush are the main decreaser plants. Increasers make up as much as 50 percent of the vegetation. Blue grama, galleta, hairy grama, and sand dropseed are the main increaser plants.

If this site is in poor condition, the vegetation is mainly galleta, blue grama, burrograss, sand dropseed, Russian-thistle, and scattered one-seed juniper.

The soils in this site are suitable for reseeding, mechanical or chemical brush control, and terracing. They are suited to farmstead windbreaks, Suitable trees and shrubs are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Regular irrigation is essential. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the total annual yield is 650 pounds per acre, air dry, in moist years and 250 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 600 pounds per acre, air dry, in moist years and 225 pounds per acre in dry years.

LOAMY SD RANGE SITE

This range site consists of well-drained soils of the Adelino, Agustin, Armijo, Latene, Madurez, Pajarito, Tome, Tres Hermanos, and Wink series. These soils have a surface layer of fine sandy loam to loam or sandy clay loam and are underlain by sandy loam to sandy clay. Slopes are 0 to 10 percent. Elevations range from 4,800 to 5,800 feet.

Permeability is moderately rapid to slow. Runoff is medium. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up 40 percent of the vegetation. Black grama is the main decreaser plant. Less abundant decreasers are alkali sacaton, blue grama, bush muhly, and winterfat. Native annuals, burrograss, galleta, and sand dropseed are the main increasers. Less abundant increasers are broom snakeweed, three-awn, and fluffgrass.

If this site is in poor condition, burrograss is the dominant forage plant in areas where the surface layer is loam and Russian-thistle and broom snakeweed are the dominant plants where the surface layer is fine sandy loam.

The soils in this site are suitable for farm ponds and for windbreaks. Suitable trees and shrubs are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Regular irrigation is essential. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the annual yield of all plants is 600 pounds per acre, air dry, in moist years and 150 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 525 pounds per acre, air dry, in moist years and 125 pounds per acre in dry years.

MALPAIS SD RANGE SITE

This range site consists only of Akela-Rock outcrop complex, 1 to 9 percent slopes. The areas are on mesas and foot slopes of old volcanic hills. The soils are well-drained, shallow gravelly sandy loam. Elevations range from 4,900 to 6,000 feet.

Permeability is moderate. Runoff is medium. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up about 60 percent of the vegetation. Black grama is the main decreaser plant. Less abundant decreasers are bush muhly, Indian ricegrass, and winterfat. Galleta, mesa dropseed, spike dropseed, and sand dropseed are the main increasers. Less abundant increasers are ring muhly, hog potato, three-awn, and prairie zinnia.

If this site is in poor condition, the vegetation is mainly three-awn, broom snakeweed, and Russian-thistle. The soils are seldom bare of all vegetation.

The soils in this site are not suitable for windbreaks, because they are too shallow.

If this range site is in excellent condition, the total annual yield of all plants is 700 pounds per acre, air dry, in moist years and 250 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 650 pounds per acre, air dry, in moist years and 200 pounds per acre in dry years.

RIVER BREAKS SD RANGE SITE

This range site consists of well-drained to somewhat excessively drained soils of the Bluepoint and Caliza series. These soils have a surface layer of very gravelly sandy loam to loamy sand that is underlain by gravelly loamy sand to very gravelly loamy sand. Slopes are 1 to 35 percent. Elevations range from 4,900 to 5,800 feet.

Permeability is moderately rapid to rapid. Runoff is rapid. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up about 50 percent of the vegetation. Black grama is the main decreaser plant. Less abundant decreasers are alkali sacaton, blue grama, and side-oats grama. Native annuals, tridens, dropseeds, galleta, and three-awn are the main increasers. One-seed juniper is common west of the Rio Puerco.

If this site is in poor condition, the plant cover ranges from scattered Russian-thistle, broom snakeweed, and fluffgrass to nearly bare soil.

The soils in this site are not suitable for windbreaks.

If this range site is in excellent condition, the total annual yield of all plants is about 650 pounds per acre, air dry, in moist years and 175 pounds per acre in dry years. In most places about 90 percent of the total annual yield is from plants that provide forage for cattle. In areas when one-seed juniper is an important plant, however, only about 75 percent of the total annual yield provides forage for cattle.

SALT FLATS SD RANGE SITE

This range site consists of well-drained soils of the Adelino, Armijo, Largo, Tome, and Wink series. These soils have a surface layer of loam to clay. They are commonly saline and alkali affected or are silty. They receive some runoff from adjacent soils and are subject to infrequent flooding in places. Slopes are 0 to 9 percent. Elevations range from 4,800 to 5,900 feet.

Permeability is moderately slow to very slow. Runoff is medium to rapid. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up about 65 percent of the vegetation. Alkali sacaton is the main decreaser plant. Less abundant decreasers are blue grama, fourwing saltbush, and vine-mesquite. Galleta, sand dropseed, mesa dropseed, buckwheat, and burrograss are the main increasers.

If this site is in poor condition, it is generally bare except for scattered four-wing saltbush, annual forbs, and annual grasses.

The soils in this site are suitable for farm ponds and for windbreaks. Saline- and alkali-tolerant trees and shrubs, such as Oriental arborvitae, fourwing saltbush, and Russian-olive, are suited. Regular irrigation is essential, especially while the windbreak is becoming established. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the total annual yield of all plants is 1,650 pounds per acre, air dry, in moist years and 375 pounds per acre in dry years. In most years nearly all the plant species provide forage for cattle.

SALTY BOTTOMLAND SD RANGE SITE

This range site consists of well-drained soils of the Armijo series and areas of Mixed alluvial land. The soils are saline and alkali clay or mixed alluvial soils of variable texture. They receive extra moisture from floodwaters of the Rio Grande or from irrigation tailwater. Slopes are 0 to 1 percent. Elevations range from 4,750 to 4,900 feet. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up about 70 percent of the vegetation. Alkali sacaton, vine-mesquite, and fourwing saltbush are the main decreaser plants. Increasers make up about 30 percent of the vegetation. Saltgrass and sedges are the main increasers. Invaders are mainly saltcedar, cottonwood, willow, screwbean mesquite, and Russian-olive. The invaders are especially persistent where the water table is favorable.

If this site is in poor condition, and the water table is within 5 feet of the surface, the dominant vegetation is saltcedar, screwbean mesquite, cottonwood, willow, Russian-olive, and saltgrass. If the water table is below 5 feet, the soils are nearly bare of vegetation when the site is in poor condition.

The Armijo soils in this site are suitable for chemical brush control. The areas of Mixed alluvial land are suitable for windbreaks. Cottonwood, willow, and Russian-olive are well suited to Mixed alluvial land, but irrigation is necessary while the stands are becoming established. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the total annual yield of all plants is 2,500 pounds per acre, air dry, in moist years and 1,000 pounds per acre in dry years. Nearly all of the yield is from plant species that provide forage for cattle.

SAND HILLS SD RANGE SITE

This range site (fig. 23) consists only of Bluepoint fine sand, rolling. This soil is somewhat excessively drained. It has a surface layer of fine sand that is underlain by loamy sand. Slopes are 1 to 9 percent. Elevations range from 5,000 to 5,600 feet.

Permeability is rapid. Runoff is slow. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up about 40 percent of the vegetation. Giant dropseed is the main decreaser plant. Less abundant decreasers are blue grama, black grama, Indian ricegrass, and fourwing saltbush. Sand dropseed, spike dropseed, and sand sagebrush are the main increasers. Less abundant increasers are species of mallow, mesa dropseed, Mormon-tea, buckwheat, broom dalea, and small soapweed (yucca).

If this site is in poor condition, the vegetation consists mainly of mallow, sand sagebrush, buckwheat, and broom dalea. The soil is subject to severe soil blowing if the plant cover has been damaged.

The soils in this site are suitable for windbreaks. Suitable trees and shrubs are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, Russian-olive, and skunkbush

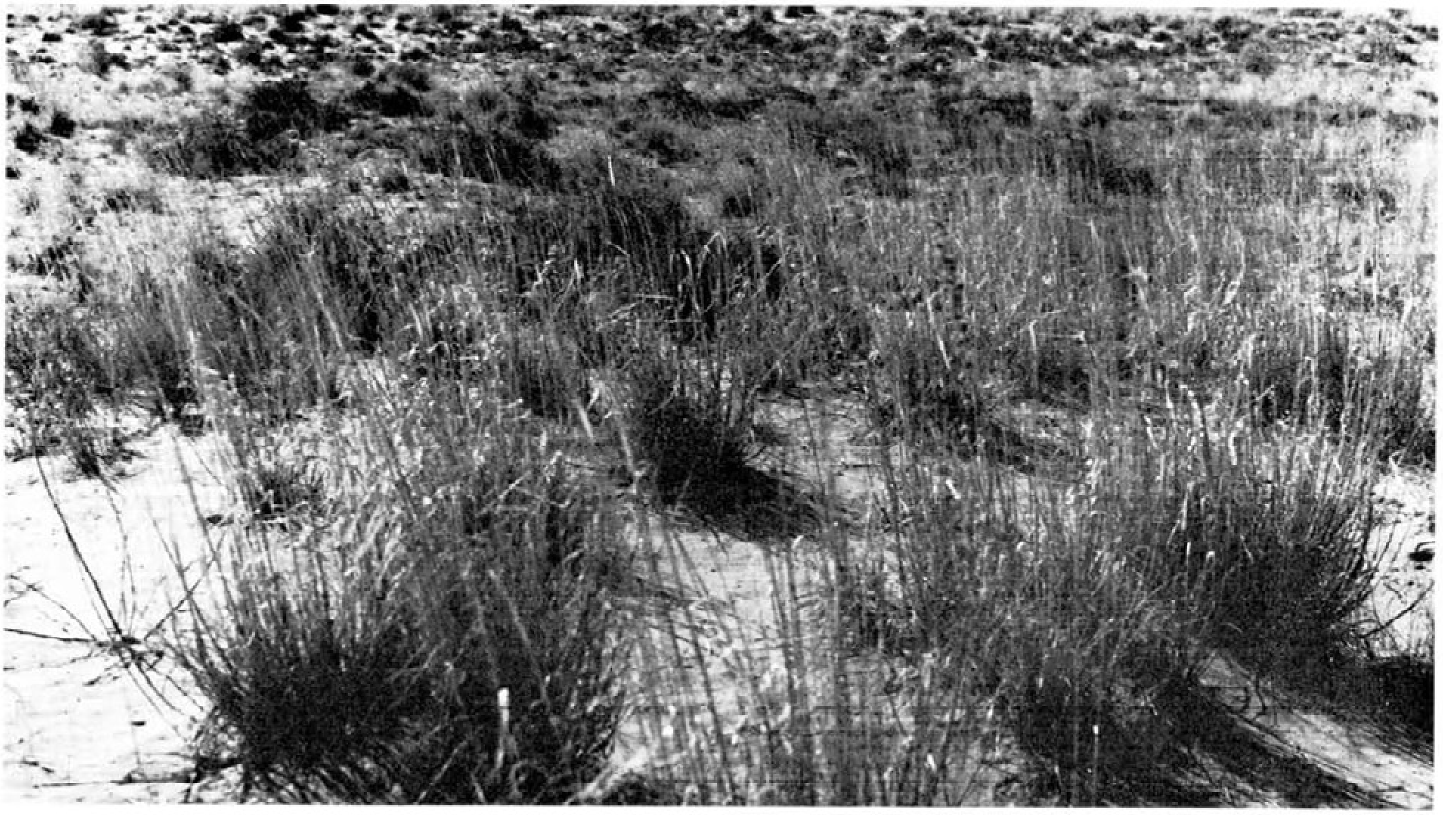

Figure 23.—An area of Sand Hills SD range site. The soil is Bluepoint fine sand, rolling. The vegetation is giant dropseed, mallow, broom dalea, and buckwheat.

sumac. Regular irrigation is essential while the young trees and shrubs are becoming established and for maintenance after they are established. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the total annual yield of all plants is 500 pounds per acre, air dry, in moist years and 200 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 450 pounds per acre, air dry, in moist years and 175 pounds per acre in dry years.

SANDY SD RANGE SITE

This range site consists of soils of the Adelino, Alemeda, Arizo, Latene, Madurez, Pajarito, and Wink series. All the soils, except the Arizo soil, are well drained and have a surface layer of loamy sand or loamy fine sand. They are underlain by gravelly loam, loam, sandy clay loam, sandy loam, or fine sand. The Arizo soil is excessively drained and has a surface layer of very gravelly loam underlain by very gravelly loamy sand. Slopes are 0 to 5 percent. Elevations range from 4,750 to 5,700 feet.

Permeability is moderate to moderately rapid, except in the Arizo soil, where permeability is very rapid. Runoff is medium to slow. The average annual precipitation is 7 to 10 inches.

If this site is in excellent condition, decreasers make up 65 percent of the vegetation. Black grama is the main decreaser plant. Less abundant decreasers are blue grama, bush muhly, New Mexico feathergrass, and Indian ricegrass. Sand dropseed, mesa dropseed, galleta, broom snakeweed, and sand sagebrush are the main increasers.

If this site is in poor condition, the vegetation generally consists of broom snakeweed, sand sagebrush, cactus, and Russian-thistle.

The soils in this site are suitable for windbreaks. Suitable trees and shrubs are Oriental arborvitae, Arizona cypress, Siberian elm, eastern redcedar, Rocky Mountain juniper, honeylocust, mulberry, Russian-olive, and skunkbush sumac. Regular irrigation is essential. Protection is needed to control grazing and prevent burning.

If this range site is in excellent condition, the total annual yield of all plants is approximately 1,000 pounds per acre, air dry, in moist years and 350 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 900 pounds per acre, air dry, in moist years and about 300 pounds per acre in dry years.

SHALLOW CP RANGE SITE

This range site consists only of the Pinon part of Dean-Pinon association, gently sloping. This soil is well drained. It has a loam surface layer that is underlain by gravelly loam overlying limestone bedrock at depths of 10 to 20 inches. Slopes are 3 to 10 percent. Elevations range from 5,800 to 6,300 feet.

Permeability is moderately slow. Runoff is medium. The average annual precipitation is 10 to 14 inches.

If this site is in excellent condition, decreasers make up at least 60 percent of the vegetation. Black grama, Scribner needlegrass, Metcalfe muhly, side-oats grama, and winterfat are the main decreasers. Increasers make up as much as 40 percent of the vegetation. Blue grama, galleta, one-seed juniper, Spanish-dagger, small soapweed (yucca), and skunkbush sumac are the main increasers.

If this site is in poor condition, the dominant range plants are blue grama, galleta, burrograss, one-seed juniper, and skunkbush sumac.

The soils in this site are suitable for mechanical brush control, but they are too shallow to be suitable for windbreaks.

If this range site is in excellent condition, the total annual yield of all plants is 900 pounds per acre, air dry, in moist years and 300 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 750 pounds per acre, air dry, in moist years and 250 pounds per acre in dry years.

SHALLOW SANDSTONE WP RANGE SITE

This range site consists only of Farb-Rock outcrop complex, 5 to 25 percent slopes. The soils are shallow to very shallow gravelly sandy loam. They are excessively drained. Elevations range from 5,400 to 6,200 feet.

Permeability is moderately rapid. Runoff is medium to rapid. The average annual precipitation is 9 to 12 inches.

If this site is in excellent condition, decreasers make up 60 percent of the vegetation. Black grama and side-oats grama are the main decreaser plants. Galleta, mesa dropseed, spike dropseed, sand dropseed, fluffgrass, one-seed juniper, broom snakeweed, and pinyon pine are the main increasers.

If this site is in poor condition, the vegetation is mainly fluffgrass, broom snakeweed, and one-seed juniper. Large areas may be bare of all vegetation except annuals.

The soils in this site are too shallow to be suitable for windbreaks.

If this range site is in excellent condition, the total annual yield of all plants is 400 pounds per acre, air dry, in moist years and 100 pounds per acre in dry years. The estimated annual yield of species that provide forage for cattle is 300 pounds per acre, air dry, in moist years and 75 pounds per acre in dry years.

Use of the Soils for Wildlife [4]

This survey area has many kinds of landscapes. They range from fertile, irrigated farms in the Rio Grande valley to semidesert grasslands on the mesas and piedmonts and finally to rugged, tree- and shrub-dotted slopes of the Manzano Mountains.

Wildlife is an important natural resource in this survey area. Scaled quail and mourning dove are the most abundant species, but pheasant, deer, antelope, and waterfowl also find habitat. Bears are sighted occasionally, and there are a few turkeys.

The suitability of the soils for wildlife species depends on the amount, quality, and distribution of food, shelter,

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[4] EDWIN A. SWENSON, State biologist, Soil Conservation Service, assisted with the preparation of this section.

TABLE 3.—*Suitability of the soils*

Wildlife habitat group	Mountain forests and grasslands	Foothill trees and shrubs	Tall or short prairie grasses	Semidesert shrubs and grasses
A	Poorly suited	Poorly suited	Poorly suited	Moderately suited
B	Poorly suited	Poorly suited	Poorly suited	Moderately suited
C	Poorly suited	Poorly suited	Poorly suited	Moderately suited
D	Poorly suited	Poorly suited	Poorly suited	Well suited
E	Poorly suited	Poorly suited	Moderately suited	Well suited
F	Poorly suited	Poorly suited	Poorly suited	Moderately suited
G	Moderately suited	Well suited	Moderately suited	Poorly suited
H	Poorly suited	Moderately suited	Well suited	Poorly suited
I	Poorly suited	Poorly suited	Poorly suited	Moderately suited
J	Poorly suited	Poorly suited	Moderately suited	Moderately suited
K	Poorly suited	Poorly suited	Poorly suited	Moderately suited
L	Poorly suited	Moderately suited	Moderately suited	Poorly suited
M	Poorly suited	Moderately suited	Poorly suited	Poorly suited
N	Poorly suited	Poorly suited	Poorly suited	Poorly suited
O	Poorly suited	Poorly suited	Poorly suited	Poorly suited

[1] If water is available, the soils of this group are moderately suited where the slope is 0 to 3 percent.

and water. If any of these elements of wildlife habitat are lacking, inadequate, or inaccessible, the species is scarce or entirely lacking. Land use, kinds and patterns of vegetation, and the supply and distribution of water directly affect the kind, quality, and abundance of wildlife habitat.

The soils in the survey area are grouped in table 3 into 15 wildlife habitat groups. The soils in each group are rated according to their suitability for elements of wildlife habitat. The ratings show only the potential of the soils to provide the habitat necessary to support desired populations of animals. They do not necessarily reflect existing habitat, and onsite appraisal of existing conditions is needed before planning specific areas for wildlife habitat.

The information in this section can be used in—

1. Planning the broad use of parks, wildlife refuges, nature study areas, and recreational developments.
2. Selecting the better suited soils for creating, improving, and maintaining specific kinds of wildlife habitat.
3. Determining the relative intensity of management needed for individual habitat.
4. Determining areas that are suitable for acquisition for broad-scale use for wildlife habitat.
5. Making special interpretations for local areas in other publications.

Wildlife habitat types

In table 3, nine elements of wildlife habitat are rated by wildlife habitat group. Soils that are suitable for vigorous growth of many kinds of key plants for wildlife habitat are rated well suited. Soils suitable for the growth of several key species are rated moderately suited. Soils that support only a few key species, or none, are rated poorly suited.

Mountain forests and grasslands are areas that support large trees and associated grasses, forbs, and shrubs and meadows or open parks. The key plants are fir, spruce, aspen, ponderosa pine, snowberry, buffaloberry, mountainmahogany, sedges, skunkbush sumac, serviceberry, cliffrose, bluegrass, and fescue.

Foothill trees and shrubs refers to areas of mountain slopes and foothills that support small native trees, shrubs, associated grasses, and forbs. The key plants are pinyon pine, one-seed juniper, blue grama, side-oats grama, mountainmahogany, Gambel oak, and shrub live oak.

Tall or short prairie grasses refers to areas of rolling plains and lower mountain slopes that support native grasses, shrubs, and forbs. The key plants are blue grama, bluestem, buffalograss, vine-mesquite, western wheatgrass, galleta, tobosa, cliffrose, serviceberry, and skunkbush sumac. Sunflowers, crotons, and pigweed grow in disturbed areas or ponded depressions.

Semidesert shrubs and grasses refers to areas of native grasses and shrubs. The key plants are alkali sacaton, three-awn, sand sagebrush, Apache-plume, creosotebush, and cactus.

Domestic seed and grainfields refers to cultivated fields used for domestic grain and seeds producing annual

for elements of wildlife habitat

Domestic seed and grainfields (irrigated)	Domestic pastures and hayfields (irrigated)	Bosque bottoms	Wetland plants	Shallow-water impoundments
Well suited	Well suited	Moderately suited	Poorly suited	Well suited.
Well suited	Well suited	Moderately suited	Poorly suited	Moderately suited.
Well suited to moderately suited	Well suited to moderately suited.	Moderately suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.[1]
Poorly suited	Moderately suited	Moderately suited	Poorly suited	Moderately suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.[1]
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.[1]
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.
Not applicable	Not applicable	Well suited	Moderately suited	Moderately suited.
Not applicable	Not applicable	Poorly suited	Poorly suited	Poorly suited.

herbaceous plants. The key plants are barley, corn, oats, grain sorghum, wheat, Japanese millet, and proso millet. The ratings apply only to irrigated areas.

Domestic pastures and hayfields refers to areas that are planted to domestic perennial grasses and herbaceous legumes. The key plants are alfalfa, clover, tall wheatgrass, tall fescue, smooth brome, orchardgrass, and weeping lovegrass. The ratings apply only to irrigated areas.

Bosque bottoms are areas adjacent to the Rio Grande where native trees, grasses, and shrubs grow. The areas receive extra water from flooding, or the soils have a high water table, but they are not excessively wet. The key plants are cottonwood, willow, and tamarisk.

Wetland plants refers to naturally moist to wet sites that support wetland plants, but not submerged or floating aquatics. The key plants are saltmarsh bulrush, saltgrass, and cattail.

Shallow-water impoundments refers to impoundments in which water can be maintained at depths not exceeding 3 feet. The soils of the wildlife habitat groups are rated according to their suitability for retaining water, as well as their limitations for production of plants that provide food for waterfowl.

Wildlife habitat groups

Each wildlife habitat group in the survey area is briefly described in the following pages. The descriptions of the groups give information about soil characteristics that influence land use and the kinds and patterns of vegetation, the present land use and vegetation, and the suitability of the soils for kinds of wildlife.

The names of the soil series represented are mentioned in the description of each wildlife habitat group, but the listing of the series name does not necessarily indicate that all the soils of a series are in the same group. The miscellaneous land types Gullied land and Riverwash were not placed in a wildlife habitat group. The names of all the soils in any given wildlife habitat group can be learned by referring to the "Guide to Mapping Units."

WILDLIFE HABITAT GROUP A

This group consists of soils of the Belen, Glendale, and Largo series. The areas are in the irrigated Rio Grande valley. Slopes are 0 to 1 percent.

The soils are well drained. Their surface layer is loam or clay loam underlain by clay loam to clay.

Permeability is moderately slow to slow. Runoff is very slow. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of alkali sacaton, saltgrass, vine-mesquite, and fourwing saltbush.

The soils in this group are used for irrigated hay, small grains, row crops, permanent pasture, and unimproved native pasture. Some tracts are used in community development and recreation. Irrigated areas are well suited to habitat for pheasant. The soils are well suited to habitat for dove, quail, and waterfowl. They are poorly suited to habitat for turkey, deer, antelope, and elk.

WILDLIFE HABITAT GROUP B

This group consists of soils of the Gila and Largo series and the loamy subsoil variant of the Vinton series. The areas are in the irrigated Rio Grande valley. Slope ranges from 0 to 3 percent, but in most places it is 0 to 1 percent.

The soils are well drained. Their surface layer is clay loam to loamy fine sand underlain by silty clay loam to very fine sandy loam or loam.

Permeability is moderately rapid to moderately slow. Runoff is very slow to medium. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of alkali sacaton, saltgrass, vine-mesquite, and fourwing saltbush.

The soils in this group are used for irrigated hay, small grains, row crops, permanent pasture, orchards, and unimproved native pasture. Some tracts are used in community development. Irrigated areas are well suited to habitat for pheasant. The soils are well suited to habitat for dove and quail. They are moderately suited to well suited to habitat for waterfowl and are poorly suited to habitat for turkey, deer, antelope, and elk.

WILDLIFE HABITAT GROUP C

This group consists of soils of the Agua, Anapra, Bluepoint, Brazito, and Vinton series. The areas are in the irrigated Rio Grande valley. Slopes are 0 to 1 percent on all soils except those of the Bluepoint series. Slopes are 1 to 3 percent on the Bluepoint soils.

The soils are well drained to somewhat excessively drained. Their surface layer is clay loam to loamy fine sand underlain by clay loam to sand.

Permeability is moderately slow to rapid above the substratum. It is moderately rapid to rapid in the substratum. Runoff is slow to very slow. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of alkali sacaton, saltgrass, dropseed, and fourwing saltbush.

The soils in this group are used for irrigated hay, small grains, row crops, permanent pasture, and unimproved native pasture. Some tracts are used in community development. Irrigated areas are well suited to habitat for pheasant. The soils are well suited to habitat for dove and quail. They are poorly suited to habitat for turkey, deer, antelope, elk, and waterfowl.

WILDLIFE HABITAT GROUP D

This group consists of soils of the Bluepoint series. The areas are on valley-filling alluvial fans along the Rio Grande and on sandy mesas and piedmonts. Slopes are 1 to 9 percent.

The soils are somewhat excessively drained. Their surface layer is loamy fine sand to fine sand underlain by loamy sand or loamy fine sand.

Permeability is rapid. Runoff is slow. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of giant dropseed, mesa dropseed, sand dropseed, black grama, galleta, broom dalea, broom snakeweed, fourwing saltbush, and sand sagebrush.

The soils in this group are used for native range and community development. They are well suited to habitat for dove and quail, but they are poorly suited to habitat for turkey, pheasant, deer, antelope, elk, and waterfowl.

WILDLIFE HABITAT GROUP E

This group consists of soils of the Adelino, Alemeda, Latene, Madurez, Pajarito, and Wink series. The areas are on piedmonts and alluvial fans throughout the survey area. Slopes are 0 to 9 percent.

The soils are well drained. Their surface layer is loamy fine sand or loamy sand underlain by sandy clay loam to sandy loam or gravelly loam. Soils of the Alemeda series are moderately deep to basalt bedrock.

Permeability is moderate to moderately rapid. Runoff is slow. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of galleta, black grama, mesa dropseed, sand dropseed, Indian ricegrass, sand sagebrush, broom snakeweed, and Russian-thistle.

The soils in this group are used for range and community development. They are well suited to habitat for dove and quail, and they are moderately suited to well suited to habitat for antelope. They are poorly suited to habitat for turkey, pheasant, deer, elk, and waterfowl.

WILDLIFE HABITAT GROUP F

This group consists of soils of the Armijo series. The areas are in the irrigated Rio Grande valley. Slopes are 0 to 1 percent.

The soils are well drained. Their surface layer is clay to loam underlain by clay.

Permeability is very slow. Runoff is very slow. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of alkali sacaton, saltgrass, and fourwing saltbush.

The soils in this group are used for unimproved native pasture, irrigated hay, and small grains. A tract of these soils is in the town of Belen.

Soils of this group are moderately suited to well suited to use for habitat for waterfowl. Irrigated areas are moderately suited to well suited to habitat for pheasant. The soils are moderately suited to well suited to habitat for dove and quail. They are poorly suited to habitat for turkey, deer, antelope, and elk.

WILDLIFE HABITAT GROUP G

This group consists of soils of the Deama, Laporte, Salas, and Santa Fe series. The areas are in the Manzano Mountains, mainly in the southeastern part of the survey area. Slopes are 15 to 70 percent.

The soils are well drained. Their surface layer is gravelly loam to very stony loam underlain by gravelly loam to very gravelly clay loam and bedrock.

Permeability is moderate. Runoff is rapid. The average annual precipitation is 10 to 14 inches.

The native vegetation consists of black grama, hairy grama, side-oats grama, Scribner needlegrass, Metcalfe muhly, blue grama, Arizona fescue, one-seed juniper, pinyon pine, skunkbush sumac, Gambel oak, shrub live oak, Apache-plume, and mountainmahogany.

The soils in this group are used for native range and recreation. They are well suited to habitat for deer and moderately suited to well suited to habitat for turkey, antelope, and elk. They are poorly suited to habitat for pheasant, dove, quail, and waterfowl.

WILDLIFE HABITAT GROUP H

This group consists of soils of the Dean, Hassell, and Largo series. The areas are in the southeastern corner of the survey area. Slopes are 2 to 7 percent.

The soils are well drained. Their surface layer is loam underlain by loam to heavy clay loam.

Permeability is moderately slow to slow. Runoff is medium. The average annual precipitation is 8 to 14 inches.

The native vegetation consists of blue grama, black grama, hairy grama, galleta, alkali sacaton, sand dropseed, fourwing saltbush, Russian-thistle, and scattered one-seed juniper.

The soils in this group are used for native range. They are well suited to habitat for antelope and moderately suited to well suited to habitat for deer. They are poorly suited to habitat for turkey, pheasant, dove, quail, elk, and waterfowl.

WILDLIFE HABITAT GROUP I

This group consists of soils of the Adelino, Agustin, Armijo, Latene, Madurez, Pajarito, Tome, Tres Hermanos, and Wink series. The areas are on piedmonts and alluvial fans throughout the survey area. Slope ranges from 0 to 10 percent, but in most places it is 1 to 5 percent.

The soils are well drained. Their surface layer is sandy clay loam, loam, very fine sandy loam, or fine sandy loam underlain by sandy clay to sandy loam.

Permeability is moderately rapid to very slow. Runoff is slow to rapid. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of galleta, burrograss, sand dropseed, black grama, alkali sacaton, winterfat, Russian-thistle, and broom snakeweed.

The soils in the group are used for native range and community development. They are moderately suited to well suited to habitat for dove and quail. They are poorly suited to habitat for turkey, pheasant, deer, antelope, waterfowl, and elk.

WILDLIFE HABITAT GROUP J

This group consists of soils of the Millett and Tesajo series. The areas are on alluvial fans in the eastern part of the survey area. Slope ranges from 1 to 9 percent, but in most places it is 3 to 7 percent.

The soils are well drained to somewhat excessively drained. Their surface layer is loam or gravelly loam underlain by gravelly sandy clay loam or very gravelly loam.

Permeability is moderate to rapid. Runoff is medium. The average annual precipitation is 9 to 12 inches.

The native vegetation consists of black grama, blue grama, side-oats grama, sand dropseed, and cactus.

The soils in this group are used as native range. They are moderately suited to well suited to habitat for dove, quail, and antelope. They are poorly suited to habitat for turkey, pheasant, deer, elk, and waterfowl.

WILDLIFE HABITAT GROUP K

This group consists of soils of the Akela, Arizo, Bluepoint, Caliza, and Nickel series and of Rock outcrop. The areas are on alluvial fans and terraces or basalt lava flows throughout the survey area. Slope ranges from 1 to 35 percent, but in most places it is 5 to 20 percent.

The soils are well drained to excessively drained and are gravelly to very gravelly; some are shallow to bedrock. Their surface layer is loamy sand, gravelly sandy loam, very gravelly loam, or very gravelly sandy loam. This layer is underlain by gravelly loamy sand to very gravelly sandy loam.

Permeability is moderately slow to rapid. Runoff is medium to rapid in most places. The average annual precipitation is 7 to 10 inches.

The native vegetation consists of galleta, sand dropseed, burrograss, fluffgrass, Indian ricegrass, black grama, three-awn, and broom snakeweed.

The soils in this group are used as native range. They are well suited to moderately suited to habitat for dove and quail. They are poorly suited to habitat for turkey, pheasant, deer, antelope, elk, and waterfowl.

WILDLIFE HABITAT GROUP L

This group consists of soils of the Farb, Ildefonso, Pinon, and Sedillo series. The areas are along the eastern and western boundaries of the survey area. Slope ranges from 3 to 25 percent, but in most places it is 3 to 9 percent.

The soils are well drained. Their surface layer is loam, gravelly loam, very stony sandy loam, or very gravelly loam underlain by gravelly sandy loam to very gravelly clay loam. They are very gravelly, or they are shallow to bedrock.

Permeability is moderately slow to rapid. Runoff is medium to rapid. The average annual precipitation is 10 to 14 inches.

The native vegetation consists of black grama, blue grama, galleta, side-oats grama, hairy grama, bush muhly, sand dropseed, Scribner needlegrass, Metcalfe muhly, oneseed juniper, beargrass, skunkbush sumac, and small soapweed (yucca).

The soils in this group are used as native range. They are moderately suited to well suited to habitat for deer and antelope. They are poorly suited to habitat for turkey, pheasant, dove, quail, elk, and waterfowl.

WILDLIFE HABITAT GROUP M

This group consists of the miscellaneous land type Rock land and of the Rock outcrop-Akela complex, 10 to 50 percent slopes. The areas occur in scattered parts of the survey area. Slopes are 10 to 80 percent.

The soils are very shallow to shallow over bedrock. Runoff is rapid. The average annual precipitation is 7 to 14 inches.

The native vegetation consists of blue grama, black grama, hairy grama, side-oats grama, Scribner needlegrass, sand dropseed, galleta, Metcalfe muhly, one-seed juniper, pinyon pine, mountainmahogany, and skunkbush sumac.

The soils in this group are used as native range. They are moderately suited to well suited to habitat for deer. They are poorly suited to habitat for turkey, pheasant, dove, quail, antelope, elk, and waterfowl.

TABLE 4.—*Engineering*

[Tests performed by the New Mexico State Highway Department in accordance with

Soil name and location	New Mexico report No.	Depth from surface	Mechanical analyses[1] Percentage passing sieve—			
			3-in.	2-in.	1-in.	¾-in.
Adelino fine sandy loam; from an area of Tome-Adelino association, slightly saline and alkali:		*Inches*				
8 miles northwest of Belen, 0.45 mile east of dirt reservoir. (Modal)	63–10934	8–16	--------	--------	--------	--------
	63–10935	16–26	--------	--------	--------	--------
Belen clay loam:						
3 miles southwest of Los Lunas, northeast corner of Middle Rio Grande Branch Experiment Station. (Finer textured than modal)	63–10922	0–29	--------	--------	--------	--------
	63–10923	29–40	--------	--------	--------	--------
Bluepoint loamy sand; from an area of Bluepoint-Wink complex, hummocky:						
40 feet east of gasline, 0.6 mile north of N. Mex. Highway 6, 3.5 miles southeast of intersection of N. Mex. Highways 6 and 47. (Modal)	68–1617	0–9	--------	--------	--------	--------
	68–1618	47–62	--------	--------	--------	--------
Brazito sandy clay loam, thick surface:						
90 feet east of gate, 60 feet north of gnarled cottonwood tree, 0.5 mile north of Casa Colorado Church, 0.45 mile west on dirt road. (Modal)	68–1628	0–15	--------	--------	--------	--------
	68–1629	15–40	--------	--------	--------	--------
	68–1630	40–60	--------	--------	--------	--------
Caliza very gravelly sandy loam; from an area of Caliza-Bluepoint complex, 1 to 25 percent slopes:						
3 miles east of Rio Puerco Bridge, N. Mex. Highway 6, 1.1 miles northwest of old highway stone bridge. (Modal)	63–10939	0–5	100	88	70	65
	63–10940	5–14	100	90	73	68

See footnotes at end of table.

WILDLIFE HABITAT GROUP N

This group consists only of Mixed alluvial land. The areas are along the Rio Grande. Slopes are 0 to 3 percent.

The soil material is sandy in most places, but the texture ranges from clay loam to loamy fine sand. Runoff is slow. The soils have a fluctuating water table and are subject to flooding.

The native vegetation consists of saltgrass, alkali sacaton, saltcedar, cottonwood, willow, and fourwing saltbush.

This miscellaneous land type is used for unimproved native pasture, fireplace wood, and recreation. It is moderately suited to well suited to habitat for waterfowl. It is poorly suited to habitat for turkey, pheasant, dove, quail, deer, antelope, and elk.

WILDLIFE HABITAT GROUP O

This group consists of the land types Badland and Rock outcrop and Landslides. The areas are along the margins of the valleys of the Rio Grande and the Rio Puerco and in the northwestern, northeastern, and southeastern corners of the survey area. Slopes are 25 to 100 percent.

The sediment ranges from soft, unconsolidated material to stones and rock outcrops. Runoff is rapid to very rapid. The average annual precipitation is 7 to 14 inches.

Vegetation is limited mainly to the small pockets of soils that are included with these land types. The native vegetation on these inclusions is side-oats grama, sand dropseed, galleta, one-seed juniper, beargrass, skunkbush sumac, and Spanish-dagger.

These land types are poorly suited to habitat for turkey, pheasant, dove, quail, deer, antelope, elk, and waterfowl.

Engineering Uses of the Soils [5]

This section provides information for engineers, contractors, farmers, and others who use soil as structural material or as foundation material upon which structures are built. Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water-storage facilities, erosion-control structures, drainage systems, and sewage-disposal systems. Among the properties most important to engineers are permeability, shear strength, compaction characteristics, drainage, shrink-swell potential, water-holding capacity, grain-size distribution, plasticity, and soil reaction. The depth to the water table and depth to bedrock are also important.

Information concerning these and related soil properties is given in tables 4, 5, and 6. Only the data in table 4 are from actual laboratory tests. Estimates of soil properties significant in engineering are given in table 5, and interpretations of engineering properties are given in table 6.

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[5] BRUCE H. KIDMAN, area engineer, Soil Conservation Service, assisted in the preparation of this section.

test data

standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analyses [1]—Continued					Liquid limit	Plasticity index	AASHO [2]	Unified
Percentage passing sieve—Continued								
3/8-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
					Percent			
----------	----------	100	99	45	23	8	A-4(2)	SC
----------	----------	100	99	36	23	7	A-4(0)	SM-SC
----------	----------	100	99	96	69	32	A-7-5(20)	MH
----------	----------	100	99	95	27	12	A-6(9)	CL
----------	----------	100	88	10	[3] S	[4] NP	A-3(0)	SP-SM
----------	----------	100	91	16	S	NP	A-2-4(0)	SM
----------	----------	100	95	43	24	7	A-4(2)	SM
----------	----------	100	87	2	S	NP	A-3(0)	SP
----------	----------	100	85	3	S	NP	A-3(0)	SP
54	44	34	24	14	21	5	A-1-a(0)	GM-GC
55	45	30	18	8	24	7	A-2-4(0)	GP-GM

TABLE 4.—*Engineering*

Soil name and location	New Mexico report No.	Depth from surface	Mechanical analyses [1]			
			Percentage passing sieve—			
			3-in.	2-in.	1-in.	¾-in.
		Inches				
Gila loam:						
2 miles east of Peralta, 500 feet east of culvert next to ditch. (Modal)	63-10927	9-30	--------	--------	--------	--------
Glendale clay loam:						
0.8 mile east of Peralta, at south edge of field and 215 feet west of farm road culvert next to ditch. (Modal)	63-10924	0-7	--------	--------	--------	--------
	63-10925	7-14	--------	--------	--------	--------
	63-10926	14-32	--------	--------	--------	--------
Latene loam:						
20 feet northwest of ranch road, 1.6 miles northeast of N. Mex. Highway 6, 12 miles southeast of intersection of N. Mex. Highways 6 and 47. (Modal)	68-1611	0-11	--------	--------	--------	--------
	68-1612	11-37	--------	--------	--------	--------
	68-1613	37-60	--------	--------	--------	--------
Madurez loamy fine sand:						
5 miles west of Los Lunas, along N. Mex. Highway 6, 0.4 mile to communications tower and 75 feet west of road. (Modal)	63-10936	0-9	--------	--------	--------	--------
	63-10937	9-15	--------	--------	--------	--------
	63-10938	15-32	--------	--------	--------	--------
Pajarito loamy fine sand:						
440 feet west of N. Mex. Highway 47, at forks of old trail, 1 mile south of junction of N. Mex. Highways 6 and 47. (Modal)	68-1605	0-13	--------	--------	--------	--------
	68-1606	20-52	--------	--------	--------	--------
	68-1607	52-60	--------	--------	--------	--------
Sedillo very gravelly loam, 3 to 9 percent slopes:						
15 miles southeast of Belen, 1.8 miles east and 0.4 mile south of ranch headquarters. (Modal)	68-1625	0-3	--------	100	91	88
	68-1626	3-9	100	82	67	62
	68-1627	23-50	100	84	66	62
Tome very fine sandy loam:						
5.5 miles east of Tome, 8 feet east of southeast-northwest trail, 140 feet south of east-west trail, 0.55 mile east of windmill. (Modal)	68-1619	0-5	--------	--------	--------	--------
	68-1620	10-23	--------	--------	--------	--------
	68-1621	32-48	--------	--------	--------	--------
Tres Hermanos loam; from an area of Tres Hermanos-Madurez association, gently sloping:						
18 miles southeast of Belen, 20 feet east of ranch trail, 0.3 mile south of gate and farm pond. (Modal)	68-1614	0-4	--------	--------	--------	--------
	68-1615	4-9	--------	--------	--------	--------
	68-1616	25-60	--------	--------	--------	--------
Vinton loamy fine sand:						
600 feet northwest of headquarters, Middle Rio Grande Branch Experiment Station. (Modal)	63-10918	0-8	--------	--------	--------	--------
	63-10919	15-42	--------	--------	--------	--------
	63-10920	42-64	--------	--------	--------	--------
Wink loamy sand:						
50 feet north of road, 6 subdivision roads north of windmill, 1.2 miles west and 0.55 mile north of intersection of N. Mex. Highway 6 and road leading to El Paso Natural Gas Belen Station Plant. (Modal)	68-1608	0-5	--------	--------	--------	--------
	68-1609	5-22	--------	--------	--------	--------
	68-1610	37-62	--------	--------	--------	--------
Wink loamy sand, clayey substratum:						
40 feet east of Howell Road in Rio Grande Estates, 720 feet south of Tome Grant. (Finer textured than modal)	68-1602	0-9	--------	--------	--------	--------
	68-1603	15-38	--------	--------	--------	--------
	68-1604	46-64	--------	--------	--------	--------

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[1] Mechanical analyses according to AASHO Designation T 88 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service. In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-sized fractions. The mechanical analyses used in this

test data—Continued

Mechanical analyses [1]—Continued					Liquid limit	Plasticity index	AASHO [2]	Unified
Percentage passing sieve—Continued								
⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
					Percent			
----------	----------	100	98	48	S	NP	A-4(3)	SM
----------	----------	100	99	97	36	15	A-6(10)	CL
----------	----------	100	99	95	31	13	A-6(9)	CL
----------	----------	100	99	96	36	10	A-4(8)	ML-CL
----------	----------	100	93	52	S	NP	A-4(3)	ML
----------	----------	100	85	47	29	12	A-6(4)	SC
----------	----------	100	86	45	29	12	A-6(3)	SC
----------	----------	100	92	25	S	NP	A-2-4(0)	SM
----------	----------	100	91	47	31	10	A-4(2)	SM-SC
----------	----------	100	99	57	25	6	A-4(4)	ML-CL
----------	----------	100	85	29	S	NP	A-2-4(0)	SM
----------	----------	100	89	30	S	NP	A-2-4(0)	SM
----------	----------	100	93	51	S	NP	A-4(3)	ML
69	57	50	42	26	S	NP	A-2-4(0)	SM
53	43	32	20	14	38	14	A-2-6(0)	GC
49	37	25	15	7	S	NP	A-1-a(0)	GW-GM
----------	----------	100	98	51	S	NP	A-4(3)	ML
----------	----------	100	99	91	33	7	A-4(8)	ML
----------	----------	100	96	61	29	11	A-6(6)	CL
----------	----------	100	83	54	S	NP	A-4(4)	ML
----------	----------	100	90	73	38	15	A-6(9)	CL
----------	----------	100	72	49	30	7	A-4(3)	SM
----------	----------	100	95	30	S	NP	A-2-4(0)	SM
----------	----------	100	88	29	S	NP	A-2-4(0)	SM
----------	----------	100	75	10	S	NP	A-3(0)	SP-SM
----------	----------	100	93	21	S	NP	A-2-4(0)	SM
----------	----------	100	92	31	S	NP	A-2-4(0)	SM
----------	----------	100	87	34	40	14	A-2-6(1)	SM
----------	----------	100	92	26	S	NP	A-2-4(0)	SM
----------	----------	100	92	21	S	NP	A-2-4(0)	SM
----------	----------	100	97	82	40	15	A-6(10)	CL

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table are not suitable for use in naming textural classes for soil.

[2] Based on AASHO Designation M 145-49.

[3] S=Sandy.

[4] NP=Nonplastic.

TABLE 5.—*Estimated properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table. The

Soil series and map symbols	Depth to—		Depth from surface (representative profile)	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Inches	*Feet*	*Inches*			
*Adelino: Ad, AE	>60	([1])	0–38	Loam or sandy clay loam	SC or CL	A–4 or A–6
For Tome part of AE, see Tome series, unit TN. In Adelino part of unit TO, available water capacity is 0.12 to 0.14 inch per inch of soil in the upper part of the profile; reaction is pH 8.5 to 9.2 throughout; salinity is 4 to 8 millimhos per centimeter at 25° C. throughout; corrosivity is high throughout.			38–60	Sandy loam	SM	A–2 or A–4
Agua: [2]						
Ag, Am	>60	4–5	0–10	Loam or clay loam	ML or CL	A–4 or A–6
			10–30	Fine sandy loam	ML or SM	A–4
			30–60	Fine sand or sand	SP	A–3
Ah, Ak	>60	2–4	0–30	Loam or fine sandy loam	ML or SM	A–4
			30–60	Fine sand or sand	SP	A–3
*Agustin: An, AO	>60	([1])	0–29	Sandy loam to gravelly loam	ML or SM	A–4
For Adelino part of AO, see Adelino series.			29–60	Loam to gravelly sandy loam	ML or SM	A–4 or A–2
*Akela: AR	10–20	([1])	0–18	Stony sandy loam and very gravelly sandy loam.	SM or GM	A–4 or A–2
For Rock outcrop part, see Rock outcrop.			18	Bedrock.		
Alemeda: AS	20–40	([1])	0–6	Loamy fine sand or fine sandy loam.	SM	A–4 or A–2
			6–18	Sandy clay loam to gravelly loam.	SM or SC	A–4
			18–25	Very gravelly or cobbly loam.	GM or GC	A–1 or A–2
			25	Bedrock.		
Anapra: [2] At	>60	4–5+	0–28	Clay loam	CL	A–6
			28–60	Sand	SP	A–3
Arizo [3]	>60	([1])	0–60	Very gravelly loamy sand	SM or GM	A–2 or A–1
Armijo: [2 3] Au, AV, Aw, Ay	>60	4–5+	0–60	Clay or sandy clay	MH or CH	A–7
Badland: BD Too variable for valid interpretations.	0–60+	([1])				
Belen: [2] Be, Bf, Bg	>60	4–5+	0–7	Clay loam or loam	ML or CL	A–6
			7–31	Clay	MH–CH	A–7
			31–60	Fine sandy loam or loam	ML–CL	A–4 or A–6

See footnotes at end of table.

significant in engineering

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions symbol > means more than]

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Corrosivity (untreated steel pipe)
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Inches per hour*	*Inches per inch of soil*	*pH value*	*Mmhos. per cm. at 25° C.*		
0	100	100	90–100	35–60	0. 63–2. 0	0. 14–0. 18	7. 9–8. 4	0–1	Moderate	Low.
0	100	100	90–100	30–40	0. 63–6. 3	0. 11–0. 13	7. 9–8. 4	0–1	Low	Low.
0	100	100	90–100	60–80	0. 2–2. 0	0. 16–0. 18	7. 9–8. 4	1–4	Moderate	Moderate.
0	100	100	70–85	40–55	0. 63–2. 0	0. 13–0. 15	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	80–90	0–5	6. 3–20. 0	0. 05–0. 07	7. 9–8. 4	0–1	Low	Low.
0	100	100	70–95	40–55	0. 63–2. 0	0. 07–0. 09	8. 5–9. 2	4–8	Low	High.
0	100	100	80–90	0–5	6. 3–20. 0	0. 05–0. 07	7. 9–8. 4	1–4	Low	Moderate.
0	100	90–100	85–95	45–75	2. 0– 6. 3	0. 13–0. 15	7. 9–8. 4	0–1	Low	Low.
0	100	70–100	65–95	30–60	2. 0– 6. 3	0. 11–0. 15	7. 9–8. 4	0–1	Low	Low.
20–45	40–70	25–60	20–50	15–40	0. 63– 2. 0	0. 05–0. 09	7. 9–8. 4	0–1	Low	Low.
0	100	100	90–100	30–45	0. 63– 6. 3	0. 11–0. 13	7. 9–8. 4	0–1	Low	Low.
0	80–100	65–100	60–90	35–50	0. 63– 2. 0	0. 14–0. 16	7. 9–9. 0	0–1	Moderate	Low.
20	35–45	20–25	15–20	10–15	0. 63– 2. 0	0. 06–0. 08	8. 5–9. 0	1–4	Low	Moderate.
0	100	100	95–100	75–90	0. 2–0. 63	0. 19–0. 21	7. 9–8. 4	1–4	Moderate	Moderate.
0	100	100	80–90	0–5	6. 3–20. 0	0. 05–0. 07	7. 9–8. 4	0–1	Low	Low.
10	45–65	35–55	25–45	5–15	>20. 0	0. 04–0. 06	7. 9–8. 4	0–1	Low	Low.
0	100	100	95–100	90–100	>0. 06	0. 05–0. 15	8. 5–9. 5	4–24	High	High.
0	100	100	95–100	75–95	0. 06–0. 6	0. 19–0. 21	7. 9–9. 0	1–4	Moderate	Moderate.
0	100	100	95–100	90–100	0. 06–0. 20	0. 14–0. 16	7. 9–9. 0	1–4	High	High.
0	100	100	75–95	50–75	0. 63–2. 0	0. 13–0. 15	8. 5–9. 0	1–4	Low to moderate.	Moderate.

TABLE 5.—*Estimated properties*

Soil series and map symbols	Depth to—		Depth from surface (representative profile)	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Inches	*Feet*	*Inches*			
*Bluepoint: BH, BK, Bm, Bn, BO, BP, Bs, BT For Adelino part of BT, see Adelino series. For Wink part of Bs, see Wink series, unit Wk.	>60	(1)	0–62	Loamy fine sand or loamy sand.	SM or SP–SM	A–2
Br	>60	(1)	0–10	Sandy clay loam	SM or SC	A–4 or A–2
			10–60	Loamy sand	SM or SP–SM	A–2
Brazito:[2]						
Bu, Bv	>60	2–5+	0–7	Loamy fine sand to fine sandy loam.	SM	A–2 or A–4
			7–60	Sand	SP	A–3
Bw, Bx	>60	2–5+	0–15	Sandy clay loam	SC or ML	A–4 or A–6
			15–60	Sand	SP	A–3
*Caliza: Cb, CE For Bluepoint part, see Bluepoint series.	>60	(1)	0–60	Very gravelly loamy sand	GM or GP–GM	A–1 or A–2
*Deama: DL For Laporte part, see Laporte series.	9–20	(1)	0–19	Very gravelly loam	GM or SM	A-4 or A–2
			19	Bedrock.		
*Dean: DP For Pinon part, see Pinon series.	42–60+	(1)	0–11	Loam	ML	A–4
			11–50	Gravelly loam	SM or ML	A–4
*Farb: FR For Rock outcrop part, see Rock outcrop.	7–13	(1)	0–9	Gravelly sandy loam	SM	A–2
			9	Bedrock.		
Gila:[2] Ga, Gc, Gd, Ge, Gf, Gg, Gh, Gk, Gm, Gn. In units Gc, Ge, Gf, Gg, Gh, Gm, and Gn, depth to seasonal high water table is 2 to 4 feet; available water capacity is 0.08 to 0.12 inch per inch of soil; salinity is 4 to 24 millimhos per centimeter at 25° C. throughout; corrosivity is high throughout.	>60	4–5+	0–64	Loam, clay loam, very fine sandy loam, loamy fine sand, and fine sandy loam; stratified.	ML or SM	A–4
Glendale:[2] Go, Gr, Gs, Gt In units Gr and Gt, depth to seasonal high water table is 2 to 4 feet; available water capacity is 0.09 to 0.21 inch per inch of soil; salinity is 4 to 24 millimhos per centimeter at 25° C. throughout; corrosivity is high throughout.	>60	4–5+	0–60	Clay loam	CL or ML	A–6 or A–4
Gullied land:[2] GV Too variable for valid interpretations.	>60	5+				
Hassell: HA	35–60+	(1)	0–35	Clay loam	CL	A–7
			35	Clayey shale.		

See footnotes at end of table.

significant in engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Corrosivity (untreated steel pipe)
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Inches per hour*	*Inches per inch of soil*	*pH value*	*Mmhos. per cm. at 25° C.*		
0	90–100	85–100	70–95	5–20	6.3–20.0	0.07–0.09	7.9–8.4	0–1	Low	Low.
0	100	100	85–95	30–45	0.63–2.0	0.14–0.16	7.9–8.4	0–1	Moderate	Low.
0	100	100	70–95	10–25	6.3–20.0	0.07–0.09	7.9–8.4	0–1	Low	Low.
0	100	100	90–95	20–45	2.0–6.3	0.07–0.10	7.9–9.0	1–8	Low	Moderate to high.
0	100	100	80–90	0–5	6.3–20.0	0.05–0.06	7.4–8.4	1–4	Low	Moderate,
0	100	100	90–100	40–75	0.63–2.0	0.14–0.16	7.9–8.4	1–8	Moderate	Moderate.
0	100	100	80–90	0–5	6.3–20.0	0.05–0.06	7.4–8.4	1–4	Low	Moderate.
0–10	35–50	20–35	15–30	5–20	2.0–6.3	0.03–0.05	7.9–8.4	0–4	Low	Low to moderate.
10	45–80	40–60	35–55	30–50	0.63–2.0	0.10–0.12	7.9–8.4	1–4	Low	Moderate.
0	80–100	75–95	65–85	50–75	0.63–2.0	0.13–0.17	7.9–8.4	0–1	Low	Low.
0	70–80	60–70	50–65	40–60	0.06–0.2	------------	8.5–9.0	1–4	Low	Moderate.
0–5	70–100	65–75	40–60	20–35	2.0–6.3	0.07–0.09	8.5–9.0	0–1	Low	Low.
0	100	100	95–100	40–60	0.63–2.0	0.13–0.18	7.9–9.5	4–24	Low	Moderate to high.
0	100	100	95–100	95–100	0.2–0.63	0.19–0.21	7.9–9.5	1–4	Moderate	Moderate to high.
0	100	100	95–100	85–95	0.06–0.20	0.19–0.21	8.5–9.2	1–4	Moderate	Moderate.

TABLE 5.—*Estimated properties*

Soil series and map symbols	Depth to—		Depth from surface (representative profile)	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Inches	*Feet*	*Inches*			
Ildefonso: ID	>60	(1)	0–60	Very gravelly sandy loam	SM, GM, or GP–GM	A–2 or A–1
Laporte	9–17	(1)	0–11	Gravelly loam	ML	A–4
			11	Bedrock.		
Largo:[3] La, LG, Lr	>60	(1)	0–60	Silty clay loam to loam	CL	A–6
Latene: LS, LV	>60	(1)	0–11	Loam or loamy fine sand	ML or SM	A–4 or A–2
			11–60	Gravelly loam or gravelly sandy loam.	ML or SC	A–6 or A–4
*Madurez: Ma, Md, ME, Mf, MH, MK. For Bluepoint part of MH, see Bluepoint series unit BO. For Wink part of MK, see Wink series unit WU.	>60	(1)	0–10	Loamy fine sand or fine sandy loam.	SM	A–2 or A–4
			10–60	Sandy clay loam to sandy loam.	SM–SC, ML or CL	A–4 or A–6
*Millett: ML For Tesajo part, see Tesajo series.	>60	(1)	0–16	Gravelly loam and gravelly sandy clay loam.	ML	A–4
			16–60	Very gravelly sandy loam	SM	A–2
Mixed alluvial land:[4] Mn Too variable for valid interpretation.	>60	0.5–3				
*Nickel: NL For Latene part, see Latene series.	>60	(1)	0–60	Very gravelly loam and very sandy loam.	GM	A–2 or A–1
Pajarito: Pa, Pf, PH	>60	(1)	0–13	Loamy fine sand or fine sandy loam.	SM	A–2
			13–60	Fine sandy loam	SM or ML	A–2 or A–4
Pinon	10–20	(1)	0–16	Loam or gravelly loam	ML	A–4
			16	Bedrock.		
Riverwash:[4] Rv Too variable for valid interpretations.	>60	0–2				
Rock land: RW Too variable for valid interpretations.	0–6	(1)				
*Rock outcrop: RX, RZ For Akela part of RX, see Akela series. Rock outcrop part too variable for valid interpretations.	0–6	(1)				
Salas: SA	20–40	(1)	0–39	Very gravelly loam or very gravelly clay loam.	GM or GC	A–1 or A–2
			39	Bedrock.		

See footnotes at end of table.

significant in engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Corrosivity (untreated steel pipe)
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Inches per hour*	*Inches per inch of soil*	*pH value*	*Mmhos. per cm. at 25° C.*		
15	40–75	35–60	20–40	10–25	2. 0–6. 3	0. 06–0. 08	7. 9–9. 0	0–4	Low	Moderate.
5	80–90	75–85	55–65	50–60	0. 63–2. 0	0. 13–0. 15	7. 9–8. 4	0–4	Low	Low to moderate.
0	100	100	95–100	90–95	0. 20–0. 63	0. 19–0. 21	7. 9–8. 4	1–4	Moderate	Moderate.
0	100	100	85–95	30–60	0. 63–6. 3	0. 09–0. 16	7. 9–8. 4	0–1	Low	Low.
0	95–100	90–100	80–90	40–65	0. 63–2. 0	0. 11–0. 13	8. 5–9. 0	1–4	Low	Moderate.
0	100	100	90–95	20–45	0. 63–6. 3	0. 09–0. 11	7. 9–8. 4	0. 1	Low	Low.
0	100	100	90–100	45–65	0. 63–2. 0	0. 14–0. 16	7. 9–9. 0	0–4	Moderate	Low to moderate.
0	80–100	75–95	70–90	50–70	0. 63–2. 0	0. 13–0. 15	7. 9–8. 4	0–1	Moderate	Low.
0	80–100	55–65	35–45	25–35	2. 0–6. 3	0. 06–0. 08	8. 5–9. 0	0–1	Low	Low.
5	40–60	35–50	20–35	15–25	0. 2–0. 63	0. 05–0. 07	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	85–95	25–35	2. 0–6. 3	0. 09–0. 11	7. 9–8. 4	0–1	Low	Low.
0	100	100	85–95	30–55	2. 0–6. 3	0. 13–0. 15	7. 9–8. 4	0–1	Low	Low.
0–5	70–100	65–100	60–70	50–60	0–2–0. 63	0. 14–0. 16	7. 9–8. 4	1–4	Low	Moderate.
25	35–50	25–35	20–30	15–25	0. 63–2. 0	0. 10–0. 12	7. 4–9. 0	0–1	Low	Low.

TABLE 5.—*Estimated properties*

Soil series and map symbols	Depth to—		Depth from surface (representative profile)	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Inches	*Feet*	*Inches*			
Santa Fe: SF	15–32	(1)	0–24	Very gravelly loam or very gravelly clay loam.	GM or GC	A-1 or A-2
			24	Bedrock.		
Sedillo: SG, SL	>60	(1)	0–23	Very gravelly loam to very gravelly clay loam.	GM or GC	A-1 or A-2
			23–60	Very gravelly sandy loam	GW-GM or GM	A-1
Tesajo	>60	(1)	0–60	Very gravelly loam and very gravelly sandy loam.	SM	A-2
*Tome: [2] TM, TN. For Arizo part of TN, see Arizo series.	>60	(1)	0–70	Loam or very fine sandy loam	ML or CL	A-4 or A-6
TO, TR. For Adelino part of TO, see Adelino series. For Armijo part of TR, see Armijo series.	>60	(1)	0–70	Loam or silty clay loam	CL	A-6 or A-7
*Tres Hermanos: Ts, TU. For Madurez part of TU, see Madurez series.	>60	(1)	0–20	Loam or clay loam	ML or CL	A-4 or A-6
			20–60	Gravelly sandy loam	SM	A-4
Vinton: [2] Vd, Vg, Vm	>60	4–5+	0–11	Loamy fine sand, loam, sandy clay loam, or clay loam.	ML, SM or CL	A-4, A-2, or A-6
			11–60	Loamy fine sand	SM or SM-SP	A-2
Ve, Vf, Vh, Vk	>60	2–4	0–11	Loam or loamy fine sand	ML or SM	A-4 or A-2
			11–60	Loamy fine sand	SM or SM-SP	A-2
Vinton, variant: Vn, Vo, Vt.	>60	4–5+	0–14	Loam or sandy clay loam	ML or SC	A-4
			14–34	Loamy fine sand	SM	A-2
			34–60	Silty clay loam or sandy clay loam.	SM, ML, or CL	A-6 or A-7
*Wink: Wk, Wn, WO, Wr, WU. For Caliza part of Wr, see Caliza series. For Madurez part of WU, see Madurez series.	>60	(1)	0–9	Loamy sand or fine sandy loam	SM	A-2
			9–60	Sandy loam	SM	A-2
Wm	>60	(1)	0–46	Fine sandy loam or sandy loam	SM	A-2
			46–64	Clay loam or clay	CL	A-6 or A-7
Wink, variant: Ws	>60	(1)	0–31	Sandy loam	SM	A-2
			31–65	Clay loam or clay	CL	A-6 or A-7

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[1] The water table is not within the normal depth of observation. In most places this depth is about 5 feet unless bedrock is nearer the surface.

[2] These soils are protected from flooding by levees along the Rio Grande.

significant in engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Corrosivity (untreated steel pipe)
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Inches per hour*	*Inches per inch of soil*	*pH value*	*Mmhos. per cm. at 25° C.*		
5	45–75	20–30	15–25	10–20	0. 63–2. 0	0. 10–0. 12	7. 4–8. 4	0–1	Low	Low.
10	35–50	30–50	20–45	10–25	0. 20–0. 63	0. 10–0. 12	7. 4–8. 4	0–1	Low	Low.
10	35–45	20–35	10–20	5–15	0. 63–2. 0	0. 05–0. 07	7. 9–9. 0	0–1	Low	Low.
0	80–100	30–40	25–35	15–25	6. 3–20. 0	0. 08–0. 10	7. 4–8. 4	0–1	Low	Low.
0	100	100	95–100	60–90	0. 20–0. 63	0. 15–0. 17	7. 9–8. 4	0–1	Moderate	Low.
0	100	100	95–100	90–95	0. 06–0. 20	0. 08–0. 10	8. 5–9. 5	4–24	Moderate	High.
0	100	100	80–95	50–75	0. 63–2. 0	0. 18–0. 20	7. 9–8. 4	0–1	Moderate	Low.
0	90–100	60–100	50–80	35–50	0. 63–2. 0	0. 06–0. 08	8. 5–9. 0	0–1	Low	Low.
0	100	100	95–100	30–85	0. 63–6. 3	0. 09–0. 18	7. 9–8. 4	1–4	Moderate to low.	Moderate.
0	100	95–100	70–90	10–30	2. 0–6. 3	0. 09–0. 10	7. 9–8. 4	1–4	Low	Moderate.
0	100	95–100	95–100	30–85	0. 63–6. 3	0. 09–0. 18	8. 5–9. 2	4–24	Moderate to low.	High.
0	100	95–100	70–90	10–30	2. 0–6. 3	0. 09–0. 10	8. 5–9. 0	4–24	Low	High.
0	100	100	80–95	35–75	0. 63–2. 0	0. 14–0. 16	7. 9–8. 4	1–4	Moderate	Moderate.
0	100	100	70–90	15–30	2. 0–6. 3	0. 09–0. 10	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	80–100	45–95	0. 20–0. 63	0. 14–0. 21	7. 9–8. 4	1–4	Moderate	Moderate.
0	100	100	85–95	20–35	2. 0–6. 3	0. 08–0. 12	7. 9–8. 4	0–1	Low	Low.
0	100	100	85–95	25–35	2. 0–6. 3	0. 11–0. 13	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	85–95	20–35	2. 0–6. 3	0. 11–0. 13	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	95–100	80–95	0. 06–0. 20	0. 13–0. 15	8. 5–9. 5	4–8	High	High.
0	100	100	85–95	20–35	2. 0–6. 3	0. 11–0. 13	7. 9–8. 4	1–4	Low	Moderate.
0	100	100	95–100	80–95	0. 06–0. 20	0. 06–0. 08	8. 5–9. 5	4–16	High	High.

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[3] These soils are subject to occasional flooding or excess runoff from adjacent soils.
[4] These areas are subject to flooding.

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils
tions for referring to other series that

Soil series and map symbols	Suitability as a source of [1]—			Soil features affecting [2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds
					Reservoir area
*Adelino: Ad, AE For Tome part of AE, see Tome series.	Good to fair: salt affected.	Poor to unsuitable: mainly fine grained.	Fair: moderate shrink-swell potential.	Moderate shrink-swell potential.	Moderate permeability; slope is 0 to 5 percent.
Agua:					
Ag, Am	Good	Unsuitable for gravel; good for sand below depth of 30 inches.	Fair: moderate shrink-swell potential.	Features generally favorable.	Rapid permeability below depth of 30 inches.
Ah, Ak	Fair: salt affected.	Unsuitable for gravel; good for sand below depth of 30 inches.	Fair: moderate shrink-swell potential.	Water table at a depth of 2 to 4 feet.	Rapid permeability below depth of 30 inches.
*Agustin: An, AO For Adelino part of AO, see Adelino series.	Good	Poor: excessive fines.	Good	Slope is more than 5 percent in places.	Moderately rapid permeability.
*Akela: AR For Rock outcrop part, see Rock outcrop.	Poor: bedrock at a depth of 10 to 20 inches; gravelly and very gravelly.	Unsuitable for sand; poor for gravel; bedrock at a depth of 10 to 20 inches.	Poor: bedrock at a depth of 10 to 20 inches.	Slope is 1 to 50 percent; bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.
Alemeda: AS	Fair: bedrock at depth of 20 to 40 inches; gravelly below depth of 6 inches.	Poor to unsuitable: mainly fine-grained material; bedrock at depth of 20 to 40 inches.	Fair: moderate shrink-swell potential; bedrock at depth of 20 to 40 inches.	Moderate shrink-swell potential below depth of 6 inches.	Bedrock at depth of 20 to 40 inches.
Anapra: At	Fair: clay loam	Good for sand below depth of 28 inches; unsuitable for gravel.	Fair if mixed with sand below depth of 28 inches; moderate shrink-swell potential.	Moderate shrink-swell potential and plastic soil material to depth of 28 inches.	Rapid permeability below depth of 28 inches.

See footnotes at end of table.

properties of the soils

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instruc-
appear in the first column of this table]

Soil features affecting [2]—Continued			Soil limitations for [2]—			Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Medium shear strength; low to medium piping hazard; low permeability if compacted.	Not applicable----	Slightly salt affected in places.	Moderate: moderate shrink-swell potential.	Slight to moderate: moderate permeability.	Slight to moderate: moderate permeability.	B
Low to medium shear strength; medium to high piping hazard; low to high permeability if compacted.	Not applicable----	Moderate available water capacity above depth of 30 inches; fine sand below depth of 30 inches.	Slight to moderate: moderate shrink-swell potential above depth of 10 inches.	Slight: may contaminate ground water.	Severe: rapid permeability below depth of 30 inches.	B
Medium shear strength; high piping hazard; high permeability if compacted.	Salt affected; water table at depth of 2 to 4 feet.	Salt affected; water table at depth of 2 to 4 feet; fine sand or sand below depth of 30 inches.	Slight to moderate: moderate shrink-swell potential above depth of 10 inches.	Moderate: water table at depth of 2 to 4 feet.	Severe: rapid permeability below depth of 30 inches.	C
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable----	Moderate available water capacity; gravelly strata; slope is 2 to 9 percent in most places.	Slight------------	Slight------------	Moderate: moderate permeability; slope is 2 to 9 percent in most places.	B
Bedrock at a depth of 10 to 20 inches.	Not applicable----	Unsuitable: bedrock at a depth of 10 to 20 inches; many rock outcrops.	Severe: bedrock at a depth of 10 to 20 inches; slope is 1 to 50 percent.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	C
Bedrock at depth of 20 to 40 inches.	Not applicable----	Moderate available water capacity; very gravelly substrata; bedrock at depth of 20 to 40 inches.	Moderate: moderate shrink-swell potential below depth of 6 inches; bedrock at depth of 20 to 40 inches.	Severe: bedrock at depth of 20 to 40 inches.	Severe: bedrock at depth of 20 to 40 inches.	B
Medium shear strength; medium to high piping hazard; high permeability if compacted.	Not applicable----	Slow intake rate; low available water capacity below depth of 28 inches.	Moderate: moderate shrink-swell potential to depth of 28 inches.	Slight if installed below depth of 28 inches; may contaminate ground water.	Severe: rapid permeability below depth of 28 inches.	C

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of[1]—			Soil features affecting[2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds
					Reservoir area
Arizo	Poor: very gravelly.	Poor for sand; fair for gravel; less than 75 percent gravel.	Good	Soil areas crossed by arroyos.	Rapid permeability.
Armijo: Au, AV, Aw, Ay	Poor: clayey; salt affected.	Unsuitable: fine-grained material.	Poor: highly plastic; high shrink-swell potential.	High shrink-swell potential; unstable.	Features generally favorable.
Badland: BD	Poor: steep	Fair: strata are variable.	Fair to good: partly A–6 material.	Slopes are more than 25 percent; erodible.	Mainly rapid permeability.
Belen: Be, Bf, Bg	Poor to fair: clayey to depth of 31 inches.	Unsuitable: fine-grained material.	Poor: highly plastic; high shrink-swell potential to depth of 31 inches.	High shrink-swell potential; unstable.	Moderate permeability below depth of 31 inches.
*Bluepoint: BH, BK, Bm, Bn, BO, BP, Bs, BT. For Adelino part of BT, see Adelino series. For Wink part of Bs, see Wink series, unit Wk.	Poor: sandy	Poor for sand; unsuitable for gravel; local tracts contain more than 15 percent gravel.	Good	Subject to soil blowing; some tracts are crossed by arroyos; slope is more than 5 percent in places.	Rapid permeability.
Br	Fair to depth of 10 inches; sandy below 10 inches.	Poor for sand below depth of 10 inches; unsuitable for gravel.	Good	Subject to water erosion.	Rapid permeability below depth of 10 inches.
Brazito: Bu, Bv	Poor: sandy	Good for sand below depth of 7 inches; unsuitable for gravel.	Good	Subject to soil blowing; water table at depth of 4 to 5 feet or more.	Rapid permeability below depth of 7 inches.
Bw, Bx	Fair to depth of 15 inches; some areas are saline and alkali.	Good for sand below depth of 15 inches; unsuitable for gravel.	Fair: moderate shrink-swell potential.	Water table at depth of 2 to 5 feet.	Rapid permeability below depth of 15 inches.

See footnotes at end of table.

properties of the soils—Continued

Soil features affecting [2]—Continued			Soil limitations for [2]—			Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Medium to high shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Low available water capacity; very gravelly; subject to occasional flooding.	Severe: subject to occasional flooding.	Slight	Severe: rapid permeability.	A
Low shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Very slow intake rate and permeability; mainly salt affected.	Severe: high shrink-swell potential.	Severe: very slow permeability.	Slight: subject to occasional flooding in places.	D
Steep; erodible	Not applicable	Unsuitable: steep and very steep; erodible.	Severe: susceptible to sliding.	Severe: steep	Severe: steep	C
Low to medium shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Slow intake rate; slow permeability; salt affected in places.	Severe: high shrink-swell potential to depth of 31 inches.	Moderate if installed below depth of 31 inches; may contaminate ground water.	Slight to depth of 31 inches; moderate permeability below depth of 31 inches.	C
Medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Low available water capacity; rapid permeability; severe erosion hazard; slope is more than 5 percent in places.	Slight	Slight if slope is 0 to 8 percent; moderate if 8 to 15; severe if more than 15.	Severe: rapid permeability.	A
Medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Low available water capacity; rapid permeability below depth of 10 inches.	Slight below depth of 10 inches.	Slight	Severe: rapid permeability below depth of 10 inches.	B
Medium shear strength; medium to high piping hazard; high permeability if compacted.	Not applicable	Low available water capacity; rapid permeability below depth of 7 inches; erosion hazard; water table at depth of 4 to 5 feet or more.	Slight	Slight; may contaminate ground water.	Severe: rapid permeability below depth of 7 inches.	A
Medium shear strength; medium to high piping hazard; high permeability if compacted.	Not applicable	Low available water capacity; rapid permeability below depth of 15 inches; water table at depth of 2 to 5 feet.	Slight below depth of 15 inches.	Moderate to severe: may contaminate ground water; water table at depth of 2 to 5 feet.	Severe: rapid permeability below depth of 15 inches.	B

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of[1]—			Soil features affecting[2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds
					Reservoir area
*Caliza: Cb, CE For Bluepoint part, see Bluepoint series.	Poor: very gravelly.	Fair to good; screening required for sand.	Good if binder is added.	Slope is as much as 25 percent.	Moderately rapid permeability.
*Deama: DL For Laporte part, see Laporte series.	Poor: very gravelly; bedrock at depth of 9 to 20 inches.	Unsuitable for sand; poor for gravel; bedrock at depth of 9 to 20 inches.	Poor: bedrock at depth of 9 to 20 inches.	Slope is 15 to 50 percent.	Bedrock at depth of 9 to 20 inches.
*Dean: DP For Pinon part, see Pinon series.	Fair: caliche fragments.	Unsuitable: caliche fragments.	Fair: high lime content; high content of fine particles.	Slope is 5 to 7 percent in places.	Slow permeability; high content of lime below depth of 11 inches.
*Farb: FR For Rock outcrop part, see Rock outcrop.	Poor: bedrock at depth of 7 to 13 inches.	Unsuitable: bedrock at depth of 7 to 13 inches.	Poor: bedrock at depth of 7 to 13 inches.	Bedrock at depth of 7 to 13 inches.	Bedrock at depth of 7 to 13 inches; gravelly.
Gila:					
Ga, Gd, Gk	Good	Unsuitable: mainly fine-grained material.	Fair: some strata of A-6 material; high content of fine particles.	Features generally favorable.	Moderate permeability.
Gc, Ge, Gf, Gg, Gh, Gm, Gn.	Poor: salt affected.	Unsuitable: mainly fine-grained material.	Fair: some strata of A-6 material; high content of fine particles.	Water table at depth of 2 to 4 feet.	Moderate permeability; salt affected.
Glendale:					
Go, Gs	Fair: clay loam material.	Unsuitable: fine-grained material.	Fair to poor: plastic; moderate shrink-swell potential.	Plastic; unstable; moderate shrink-swell potential.	Features generally favorable.
Gr, Gt	Poor: salt affected.	Unsuitable: mainly fine-grained material.	Fair to poor: plastic; moderate shrink-swell potential.	Water table at depth of 2 to 4 feet.	Moderate permeability; salt affected.

See footnotes at end of table.

properties of the soils—Continued

Soil features affecting [2]—Continued			Soil limitations for [2]—			Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Medium to high shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable; very gravelly; moderately rapid permeability; low available water capacity; slope.	Severe: rolling slopes.	Moderate if slope is 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability; steep.	A
Medium to high shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: bedrock at depth of 9 to 20 inches; steep.	Severe: steep; bedrock at depth of 9 to 20 inches.	Severe: steep; bedrock at depth of 9 to 20 inches.	Severe: steep; bedrock at depth of 9 to 20 inches.	C
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Low available water capacity; high content of lime; slope is 5 to 7 percent in places.	Slight	Severe: slow permeability; slope is 5 to 7 percent in places.	Moderate: slow permeability; slope is 5 to 7 percent in places.	B
Medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: bedrock at depth of 7 to 13 inches; low available water capacity.	Severe: bedrock at depth of 7 to 13 inches.	Severe: bedrock at depth of 7 to 13 inches.	Severe: gravelly; bedrock at depth of 7 to 13 inches.	C
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Features generally favorable.	Slight to moderate above depth of 10 inches; slight below 10 inches.	Slight to moderate: moderate permeability.	Moderate: moderate permeability.	B
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Salt affected; water table at depth of 2 to 4 feet.	Salt affected; water table at depth of 2 to 4 feet.	Slight to moderate above depth of 10 inches; slight below 10 inches.	Moderate to severe: water table at depth of 2 to 4 feet.	Moderate: moderate permeability.	C
Low to medium shear strengh; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Moderately slow permeability.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability.	Slight	B
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Salt affected; water table at depth of 2 to 4 feet.	Salt affected; water table at depth of 2 to 4 feet.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability; water table at depth of 2 to 4 feet.	Moderate: water table at depth of 2 to 4 feet.	C

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of [1]—			Soil features affecting [2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds
					Reservoir area
Gullied land: GV	Poor: erodible; salt affected.	Unsuitable: mainly fine-grained material.	Poor: mainly plastic material.	Many steep-sided gullies.	Dissected by gullies.
Hassell: HA	Fair: clayey	Unsuitable: mainly fine-grained material.	Poor: highly plastic.	Highly plastic; unstable; moderate shrink-swell potential.	Slope is 2 to 5 percent.
Ildefonso: ID	Poor: very gravelly; slope is 10 to 20 percent.	Poor: very gravelly sandy loam.	Fair: slope is 10 to 20 percent.	Slope is 10 to 20 percent.	Moderately rapid permeability; very gravelly.
Laporte	Poor: bedrock at depth of 9 to 17 inches.	Poor to unsuitable: bedrock at depth of 9 to 17 inches.	Poor: bedrock at depth of 9 to 17 inches.	Slope is 15 to 50 percent.	Bedrock at depth of 9 to 17 inches.
Largo: La, LG, Lr	Fair: silty clay loam.	Unsuitable: mainly fine-grained material.	Poor: plastic; moderate shrink-swell potential.	Unstable; erodible; moderate shrink-swell potential.	Erodible
Latene: LS, LV	Poor: gravelly; high content of lime.	Unsuitable: excessive fines.	Poor to fair: high lime content.	Unstable below depth of 11 inches.	High lime content below depth of 11 inches.
*Madurez: Ma, Md, ME, Mf, MH, MK. For Bluepoint part of MH, see Bluepoint series, unit BO. For Wink part of MK, see Wink series, unit WU.	Fair: mainly loamy fine sand above depth of 10 inches.	Poor for sand: excessive fines; unsuitable for gravel.	Good to fair if mixed; moderate shrink-swell potential.	Moderate shrink-swell potential below depth of 10 inches.	Moderate permeability.
*Millett: ML For Tesajo part, see Tesajo series.	Fair: gravelly	Poor for sand; poor to fair for gravel; excessive fines.	Good if mixed	Slope is 5 to 9 percent in most places; gravelly and very gravelly.	Moderately rapid permeability below depth of 16 inches.

See footnotes at end of table.

properties of the soils—Continued

Soil features affecting [2]—Continued			Soil limitations for [2]—			Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Low shear strength; high piping hazard.	Severely eroded	Unsuitable: eroded; mainly salt affected.	Severe: moderate to high shrink-swell potential; erodible.	Severe: slow permeability in most places.	Severe: dissected by gullies.	C or D
Low to medium shear strength; low to medium piping hazard; low permeability if compacted.	Not applicable	Slow permeability	Moderate: moderate shrink-swell potential.	Severe: slow permeability.	Moderate: slope is 2 to 5 percent.	D
Medium to high shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: steep; very gravelly; low available water capacity.	Severe: slope is 10 to 20 percent.	Moderate to severe: slope is 10 to 20 percent.	Severe: slope is 10 to 20 percent.	B
Low to medium shear strength; high piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: steep; bedrock at depth of 9 to 17 inches.	Severe: steep; bedrock at depth of 9 to 17 inches.	Severe: steep; bedrock at depth of 9 to 17 inches.	Severe: steep; bedrock at depth of 9 to 17 inches.	C
Low to medium shear strength; low to medium piping hazard; low permeability if compacted.	Not applicable	Moderately slow permeability; erodible.	Severe: moderate shrink-swell potential; subject to occasional flooding.	Severe: moderately slow permeability.	Slight: subject to occasional flooding.	B
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Shallow to caliche; erodible.	Slight	Moderate: moderate permeability.	Moderate: caliche below depth of 11 inches.	B
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Moderate to severe hazard of soil blowing.	Slight to depth of 10 inches; moderate below 10 inches; moderate shrink-swell potential.	Slight to moderate; moderate permeability.	Moderate: moderate permeability.	B
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Very gravelly below depth of 16 inches; low available water capacity.	Moderate to depth of 16 inches; slight below depth of 16 inches.	Slight below depth of 16 inches; slope is 5 to 9 percent in places.	Moderate: rapid permeability below depth of 16 inches.	B

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of[1]—			Soil features affecting[2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds: Reservoir area
Mixed alluvial land: Mn	Poor: mainly sandy.	Unsuitable: subject to flooding; high water table.	Good	Subject to flooding; high water table.	Rapid permeability in most places.
*Nickel: NL For Latene part, see Latene series.	Poor: gravelly	Unsuitable for sand; fair for gravel; excessive fines.	Good	Slope is 5 to 25 percent.	Very gravelly
Pajarito: Pa, Pf, PH	Poor to fair: mainly sandy loam and loamy fine sand.	Poor for sand; unsuitable for gravel; excessive fines.	Fair to good: partly A-4 material.	Subject to severe soil blowing.	Moderately rapid permeability.
Pinon	Poor: bedrock at depth of 9 to 20 inches.	Unsuitable for sand; poor for gravel; gravelly loam; bedrock at depth of 9 to 20 inches.	Poor: bedrock at depth of 9 to 20 inches.	Bedrock at depth of 9 to 20 inches.	Bedrock at depth of 9 to 20 inches.
Riverwash: Rv	Poor: mainly sand.	Poor to fair for sand; unsuitable for gravel; excessive fines.	Fair to good if mixed.	Subject to flooding.	Sandy in most places.
Rock land: RW	Poor: bedrock at depth of 0 to 6 inches; slope is more than 25 percent.	Unsuitable: bedrock at depth of 0 to 6 inches.	Poor: bedrock at depth of 0 to 6 inches.	Bedrock at depth of 0 to 6 inches; slope is more than 25 percent.	Bedrock at depth of 0 to 6 inches.
*Rock outcrop: RX, RZ For Akela part of RX, see Akela series.	Poor: bedrock at depth of 0 to 6 inches; slope is more than 25 percent.	Unsuitable: bedrock at depth of 0 to 6 inches.	Poor: bedrock at depth of 0 to 6 inches.	Bedrock at depth of 0 to 6 inches; slope is more than 25 percent.	Bedrock at depth of 0 to 6 inches.
Salas: SA	Poor: steep	Unsuitable for sand; poor to fair for gravel.	Good	Bedrock at depth of 20 to 40 inches; slope is more than 25 percent.	Steep slopes

See footnotes at end of table.

properties of the soils—Continued

Soil features affecting [2]—Continued			Soil limitations for [2]—			Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Medium to high shear strength; medium to high piping hazard; low to high permeability if compacted.	Subject to flooding; high water table.	Unsuitable: subject to flooding; high water table.	Severe: subject to flooding.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	B
Medium to high shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: very gravelly; low available water capacity.	Severe: slope is 5 to 25 percent.	Moderate to severe: slope is 5 to 25 percent.	Moderate to severe: slope.	B
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Surface layer is sandy; erodible; moderately rapid permeability.	Slight	Slight	Moderate to severe: moderately rapid permeability.	B
Low to medium shear strength; high piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 20 inches.	Severe: bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 to 20 inches.	C
Medium shear strength; medium piping hazard; medium permeability if compacted.	Subject to flooding.	Unsuitable: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: sandy in most places; subject to flooding.	A
Bedrock at depth of 0 to 6 inches.	Not applicable	Unsuitable: very steep; very shallow to bedrock.	Severe: very steep.	Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.	D
Bedrock at depth of 0 to 6 inches.	Not applicable	Unsuitable: very steep; very shallow to bedrock.	Severe: very steep.	Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.	D
Medium to high shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: steep and very steep.	Severe: steep	Severe: slope is more than 25 percent; bedrock at depth of 20 to 40 inches.	Severe: slope is more than 25 percent.	C

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of [1]—			Soil features affecting [2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds: Reservoir area
Santa Fe: SF	Poor: steep	Unsuitable for sand; poor to fair for gravel.	Good	Bedrock at depth of 15 to 32 inches; slope is more than 25 percent.	Steep slopes
Sedillo: SG, SL	Poor: very gravelly.	Unsuitable for sand; fair for gravel.	Good	Very gravelly	Very gravelly
Tesajo	Poor: very gravelly.	Poor to unsuitable for sand; fair for fine gravel.	Good	Slope is more than 5 percent in places; very gravelly.	Rapid permeability.
*Tome:					
TM, TN For Arizo part of TN, see Arizo series.	Good	Unsuitable: mainly fine-grained material.	Fair: moderate shrink-swell potential.	Moderate shrink-swell potential.	Features generally favorable.
TO, TR For Adelino part of TO, see Adelino series. For Armijo part of TR, see Armijo series.	Poor: salt affected.	Unsuitable: mainly fine-grained material.	Fair to poor: moderate shrink-swell potential; high content of fine particles.	Moderate shrink-swell potential.	Salt affected
*Tres Hermanos: Ts, TU For Madurez part of TU, see Madurez series.	Fair to depth of 17 inches; gravelly.	Unsuitable: mainly fine-grained material; poor for gravel below depth of 17 inches.	Fair: moderate shrink-swell potential to depth of 17 inches.	Moderately plastic and moderate shrink-swell potential in upper 17 inches.	Moderate permeability.
Vinton:					
Vd, Vg, Vm	Fair: sandy	Fair for sand below depth of 11 inches; unsuitable for gravel.	Fair: partly A-4 and A-6 material.	Features generally favorable.	Moderately rapid permeability.
Ve, Vf, Vh, Vk	Poor: salt affected.	Fair for sand below depth of 11 inches; unsuitable for gravel.	Good	Water table at depth of 2 to 4 feet.	Moderately rapid permeability.

See footnotes at end of table.

properties of the soils—Continued

Soil features affecting [2]—Continued				Soil limitations for [2]—		Hydrologic soil group
Farm ponds—Con.				Sewage disposal		
Embankment [3]	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Septic tank filter fields	Sewage lagoons	
Medium to high shear strength; low to medium piping hazard; low to medium permeability if compacted.	Not applicable	Unsuitable: steep and very steep.	Severe: steep	Severe: slope is more than 25 percent; bedrock at depth of 24 inches.	Severe: slope is more than 25 percent.	C
Medium to high shear strength; low to medium piping hazard; low to high permeability if compacted.	Not applicable	Very gravelly; low available water capacity.	Slight; a few gullies.	Moderate: slope is 3 to 9 percent in most places; moderate permeability below depth of 23 inches.	Moderate: moderate permeability below depth of 23 inches.	B
Medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Very gravelly; low available water capacity.	Slight	Slight	Severe: rapid permeability.	A
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Moderately slow permeability.	Severe: subject to occasional flooding.	Severe: moderately slow permeability.	Slight	B
Low to medium shear strength; low to medium piping hazard; low permeability if compacted.	Salt affected; moderately slow permeability.	Moderately slow permeability; salt affected.	Severe: subject to occasional flooding.	Severe: moderately slow permeability.	Slight	C
Low to medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Moderate available water capacity; gravelly substrata.	Moderate: moderate shrink-swell potential above depth of 17 inches; slight below 17 inches.	Slight to moderate if installed below depth of 17 inches.	Moderate: moderate permeability; slope is 2 to 5 percent in places.	B
Medium shear strength; medium to high piping hazard; low to high permeability if compacted.	Not applicable	Moderate available water capacity; moderately rapid permeability.	Slight to moderate to depth of 11 inches; slight below 11 inches.	Slight: may contaminate ground water.	Severe: rapid permeability.	B
Medium shear strength; medium to high piping hazard; low to high permeability if compacted.	Salt affected; water table at depth of 2 to 4 feet.	Salt affected; water table at depth of 2 to 4 feet.	Slight to moderate to depth of 11 inches; slight below 11 inches.	Severe: water table at depth of 2 to 4 feet.	Severe: moderately rapid permeability.	B

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of[1]—			Soil features affecting[2]—	
	Topsoil	Sand and gravel	Road fill	Highway location	Farm ponds
					Reservoir area
Vinton variant: Vn, Vo, Vt.	Good	Poor for sand; unsuitable for gravel; excessive fines.	Fair to poor: A–6 or A–7 material below depth of 34 inches.	Moderate shrink-swell potential in most places.	Moderately slow permeability below depth of 34 inches.
*Wink: Wk, Wn, WO, Wr, WU. For Caliza part of Wr, see Caliza series. For Madurez part of WU, see Madurez series.	Fair: sandy	Poor for sand; fine-grained material; unsuitable for gravel.	Good	Severe hazard of soil blowing.	Moderately rapid permeability; high content of lime.
Wm	Fair: salt affected.	Poor for sand; fine-grained material; unsuitable for gravel.	Fair: A–6 or A–7 material below depth of 46 inches.	Severe hazard of soil blowing.	Moderately rapid permeability above depth of 46 inches; slow below 46 inches.
Wink variant: Ws.	Fair: salt affected.	Unsuitable: fine-grained material.	Poor: A–6 or A–7 material below depth of 31 inches.	Hazard of soil blowing.	Moderately rapid permeability above depth of 31 inches; slow below 31 inches.

[1] Topsoil is rated good, fair, or poor primarily on the basis of the characteristics and thickness of the surface layer. Sand and gravel are rated good, fair, poor, or unsuitable primarily as a probable source for use in concrete or other construction. Road fill is rated good, fair, or poor as to its performance when moved from one place and used for road subgrade at another site.

The information in this section can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils that will help in the planning and design of agricultural drainage systems, farm ponds, irrigation systems, terraces, waterways, and other structures for controlling water and conserving soil.
3. Make preliminary evaluations of soil conditions that will aid in selecting locations for highways, airports, pipelines, underground cables or other utility installations, and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel, sand, and other construction materials.
5. Correlate performance of engineering with soil mapping units to develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and from aerial photographs for the purpose of making maps and reports that will be more useful to engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations here reported can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depths of layers here reported. Even in these situations, however, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

The estimates given in this section are generally intended to apply to depths of about 5 feet, and, therefore, do not normally apply to greater depths.

properties of the soils—Continued

Soil features affecting [2]—Continued				Soil limitations for [2]—		Hydrologic soil group
Farm ponds—Con.	Drainage for crops and pasture	Irrigation [4]	Foundations for low buildings	Sewage disposal		
Embankment [3]				Septic tank filter fields	Sewage lagoons	
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Moderate available water capacity.	Slight to depth of 34 inches; moderate shrink-swell potential below 34 inches.	Severe: moderately slow permeability below depth of 34 inches.	Moderate: moderately rapid permeability to depth of 34 inches; moderately slow permeability below 34 inches.	B
Medium shear strength; medium to high piping hazard; low to medium permeability if compacted.	Not applicable	Sandy surface layer; erodible; high content of lime.	Slight	Moderate: moderately rapid permeability.	Severe: moderately rapid permeability.	B
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Sandy surface layer; erodible; slow permeability below depth of 46 inches.	Slight to depth of 46 inches; severe below 46 inches; high shrink-swell potential below 46 inches.	Severe: slow permeability below depth of 46 inches.	Slight to moderate: slow permeability below depth of 46 inches.	B
Low to medium shear strength; low to high piping hazard; low to medium permeability if compacted.	Not applicable	Salt affected; eroded; slow permeability below depth of 31 inches.	Slight to depth of 31 inches; severe below 31 inches; high shrink-swell potential below 31 inches.	Severe: slow permeability below depth of 31 inches.	Moderate: slope is 1 to 9 percent.	C

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[2] The soil is evaluated only to a depth of 5 feet or less.
[3] Rated for use as water-retention structure.
[4] Available irrigation water is essential. Irrigation is largely confined to the Rio Grande valley.

More than one kind of soil may occur within short distances at many construction sites in this survey area because soil mapping units generally include small areas of a different kind of soil.

Some of the terms used in this soil survey have a special meaning to soil scientists and a different meaning to engineers. The Glossary defines many of these terms according to their meaning in soil science.

Engineering classification systems

Two systems of classifying soils, the AASHO system and the Unified system, are in general use among engineers. Classification of the soils of the survey area according to both of these systems is given in this survey. These classification systems are explained in the PCA Soil Primer (*6*).

Most highway engineers classify soil materials in accordance with the system used by the American Association of State Highway Officials (*1*). In this system classification is based on gradation, liquid limit, and the plasticity index of the soils, and on field performance when the soils are used for highways. All soil materials are classified in seven basic soil groups, designated A–1 through A–7. The best materials for use in highway subgrades (gravelly soils of high bearing capacity) are classified as A–1, and the poorest (clayey soils having low strength when wet) are classified as A–7. The relative engineering values of the soils within each group are indicated by group index numbers. Group indexes range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses after the soil group symbol. It is given in table 4 for the soils tested.

The Unified system of soil classification was developed by the Department of Defense (*12*). In this system soils are classified into 15 groups, according to particle-size distribution, plasticity, liquid limit, and organic-matter content. There are eight classes of coarse-grained soils, identified by the symbols GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified by the symbols ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified by the symbol Pt.

If soil material is near a classification boundary, it is given a symbol showing both classes, for example MH or CH. The estimated classification for all the soils in the survey area, according to the Unified system, is given in table 5.

Engineering test data

Table 4 gives test data for several of the important soils in this survey area. Samples of the soils were tested by the New Mexico State Highway Department. The table shows the location where samples were taken, the depth of the sampling, and the results of tests to determine particle-size distribution and other properties significant in soil engineering.

The tests to determine liquid limit and plastic limit measure the effect of water on consistence of the soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a solid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a solid to a plastic. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range in moisture content within which a soil material is in a plastic condition.

Estimated engineering properties

In table 5 the soil series and map symbols of the soils of the survey area are listed alphabetically, and estimates of properties important in engineering are given. The estimates are based on test data shown in table 4, on information developed while conducting the soil survey, and on knowledge of the individual soils. Also given are the depth to the seasonal high water table and the depth to bedrock. In the column that shows depth from the surface, the layers indicated are representative of the layers in all the soils of that series.

The USDA texture is determined by the relative proportions of sand, silt, and clay that are less than 2.0 millimeters in diameter. Some of the terms used in the USDA textural classification are defined in the Glossary.

The estimated percentage of soil passing the sieves and the coarse fraction greater than 3 inches reflect the normal range for the soil series in this survey area. Most soils fall within the range given; the grain size of any soil, however, varies considerably. It should not be assumed, therefore, that all samples of a specific soil will fall within the range shown or that the engineering classification will invariably be as shown.

Permeability, as used in table 5, relates only to the rate of downward movement of water through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from the use of the soils were not considered.

The available water capacity, measured in inches per inch of soil depth, is the approximate amount of capillary water in the soil available for plant growth after all free water has drained away.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and relative terms used to describe soil reaction are defined in the Glossary.

Salinity affects not only the suitability of a soil for crops, but also its stability when used as a construction material and its corrosiveness to uncoated metals. The estimates of salinity are based on estimates of electrical conductivity of saturated soil extract, as expressed in millimhos per centimeter as 25° C.

Shrink-swell potential is an indication of the volume change of the soil when the moisture content changes. Shrinking and swelling of soils cause damage to building foundations, roads, and other structures. Soils that have a high shrink-swell potential present hazards to the maintenance of structures constructed in, on, or with such kinds of soil.

Corrosivity, as used in table 5, indicates the potential hazard to uncoated metal through chemical action that dissolves or weakens the structural material. Structural material may corrode when buried in soil, and a given material corrodes in some kinds of soil more rapidly than in others. Installations that intersect soil boundaries or soil horizons are more likely to be damaged by corrosion than are installations entirely in one kind of soil or soil horizon.

Engineering interpretations

Table 6 contains information about soils useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and sewage-disposal systems. Detrimental or undesirable features are emphasized, but important desirable features may be listed also. The interpretations in this table are based on information in table 5, on available test data including those in table 4, and on field experience. Although the information applies only to the soil depths given in the table, it is reasonably reliable to a depth of about 6 feet for most soils and to a greater depth for others.

The column headings in table 6 are explained in the following paragraphs.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic matter, used as a topdressing for lawns, gardens, roadbanks, and the like. The ratings indicate suitability for such use.

The ratings for sand and gravel are based on the probability that areas of the soil contain deposits of sand and gravel. The ratings do not indicate quality or size of the deposits.

Road fill is subgrade material used in the construction of roads and highways. The ratings indicate performance of soil material moved from borrow areas for these purposes.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features listed in the table, both favorable and unfavorable, are the principal ones that affect the geographic location of highways.

Farm pond reservoir areas are affected mainly by loss of water through seepage, and the soil features given in the table are those that influence such seepage.

Farm pond embankments serve as dams. The soil features of the subsoil and substratum are important in use of the soils for constructing embankments.

Drainage for crops and pasture is affected by the depth to the water table, natural drainage, and permeability. Most soils that are salt affected require drainage before they can be successfully reclaimed.

Irrigation refers to the suitability of the soils for irrigated crops. Irrigation of soils is affected by permeability, available water capacity, erosion hazard, salinity, alkalinity, presence of a water table, slope, the depth to bedrock, and the presence of coarse fragments in the soil.

Foundations for low buildings are affected chiefly by features of the undisturbed soil that affect its capacity to support low buildings that have normal foundation loads. Specific values of bearing strength are not given.

Septic tank filter fields are affected mainly by permeability, height of the water table, susceptibility of the soils to flooding, depth to bedrock, and slope.

Sewage lagoons are affected chiefly by such soil features as permeability, height of the water table, slope, and depth to bedrock.

Hydrologic soil groups are groupings of the soils that indicate their runoff potential. In table 6 the soils are classified into four hydrologic soil groups according to the Engineering Handbook of the Soil Conservation Service. The groupings are based on the intake of water at the end of long-duration storms, after prior wetting and swelling, and when the soil is not protected by plant cover.

The four hydrologic groups are defined as follows:

Group A consists of soils that soak up the most rainfall and lose the least through runoff. Group B consists of soils that absorb more than an average amount of rainfall. Group C consists of soils that absorb less than an average amount of rainfall. Group D consists of soils that soak up the least amount of rainfall and lose the most through runoff.

Use of the Soils for Town and Country Planning

Each year farming land in the survey area is converted to nonfarm uses. Table 7 can be used as a general guide by planners and others who use soil material in building subdivisions and constructing streets, in landscaping, and in preparing recreational sites. The table will also be useful to homebuilders.

The table and the maps at the back of this survey can serve as a guide and can eliminate some sites from further consideration. They are not intended, however, as a substitute for detailed onsite investigation if a development is being planned.

The soil factors related to community development and recreation are depth of the soil over bedrock, depth to the water table, slope, erodibility, incidence of flooding, soil texture, and content of coarse fragments. In table 7 the soils have been evaluated to a depth of 5 feet or less. The average depth to the water table under the Rio Grande flood plain in this survey area is 7 to 9 feet (*9*).

The limitations of the soils for specified uses have been rated as slight, moderate, or severe. A rating of slight means that the soils are relatively free of limitations or have limitations for a given use that are easy to overcome. A rating of moderate indicates that the soils have limitations for a given use that can be overcome by good management and careful design. A rating of severe means that the soils have limitations for a given use that are difficult to overcome or that make use of the soils for that purpose questionable.

Homesites are affected mainly by the suitability of the soil for supporting low buildings, suitability for onsite sewage disposal, and suitability for landscaping. The soil factors considered are stability, shrink-swell potential, depth to the water table, depth to bedrock, incidence of flooding, permeability, and slope.

Streets and parking lots in subdivisions are affected by features of the undisturbed soil that affect their construction and maintenance. Soil factors considered are stability, shrink-swell potential, slope, plasticity, depth to bedrock, and depth to the water table.

Sanitary landfills are dumping grounds for refuse. In many places pits are excavated to depths not normally examined in soil surveys, but fairly reliable estimates of the substrata can be made. Soil factors considered are depth to bedrock, depth to the water table, hazard of flooding, and soil texture.

Excavations are required in installation of underground utilities and in digging basements. The main soil factors considered are susceptibility of the soils to slumping in vertical cuts, depth to the water table, depth to bedrock, and stoniness.

Lawns, shrubs, and golf fairways are affected by the suitability of the soil for suitable grasses and shrubs. Although irrigation of plantings is essential, some native grasses and shrubs can be grown without irrigation.

Camp areas are sites used for tents, small sites used for camp trailers, and sites used for other activities associated with outdoor living. The sites require little preparation other than shaping and leveling spaces for tents, trailers, and parking. Suitability of the soils for supporting vegetation was not considered in making these ratings but should be considered if an area is to be used for campsites.

Picnic areas are sites that are left mainly in their natural state. Simple facilities, such as picnic tables and grills, are generally placed in these areas. The main soil factors that affect use of the soils for picnic areas are the incidence of flooding, slope, soil texture, and the presence of rocks, stones, or gravel.

Playgrounds are used for tennis courts, baseball fields, and facilities for other sports. Heavy grading or shaping may be needed to make the areas nearly level. For this reason, all the major properties of the soils should be considered in selecting suitable locations.

Paths and trails are used for hiking, bridle paths, and other extensive uses that allow for random movement of people. It is assumed that the soils are to be used as they occur in nature and that little or no soil is to be moved in preparation of the site for recreational use.

TABLE 7.—*Limitations of the soils and soil features*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils
for referring to other series that

Soil series and map symbols	Homesites	Streets and parking lots in subdivisions	Sanitary landfills [1]	Excavations
*Adelino: Ad, AE For Tome part of AE, see Tome series, unit TN.	Moderate: moderate shrink-swell potential; highly corrosive to untreated steel pipe where salt affected.	Moderate: moderate shrink-swell potential.	Slight	Slight
Agua:				
Ag, Am	Slight to moderate: moderate shrink-swell potential in clay loam surface layer.	Moderate: moderate shrink-swell potential.	Severe: seasonal water table within 4 feet of surface in places in some years.	Severe: subject to slumping below depth of 30 inches.
Ah, Ak	Moderate: water table at a depth of 2 to 4 feet; corrosive to untreated steel pipe.	Moderate: water table at a depth of 2 to 4 feet.	Severe: water table at a depth of 2 to 4 feet; hazard of water pollution.	Severe: subject to slumping below depth of 30 inches.
*Agustin: An, AO For Adelino part of AO, see Adelino series.	Slight	Slight to moderate: slope is 5 to 9 percent in places.	Slight	Slight
*Akela: AR For Rock outcrop part, see Rock outcrop.	Severe: bedrock at depth of 10 to 20 inches; slope is 10 to 50 percent in places.	Severe: bedrock at depth of 10 to 20 inches; slope is 10 to 50 percent in places.	Severe: bedrock at depth of 10 to 20 inches.	Severe: bedrock at depth of 10 to 20 inches.
Alemeda: AS	Moderate to severe: moderate shrink-swell potential below depth of 6 inches; bedrock at depth of 20 to 40 inches.	Moderate: moderate shrink-swell potential below depth of 6 inches.	Severe: bedrock at depth of 20 to 40 inches.	Severe: bedrock at depth of 20 to 40 inches.
Anapra: At	Moderate: moderate shrink-swell potential to a depth of 28 inches.	Moderate to severe: plastic soil; moderate shrink-swell potential.	Severe: in places seasonal water table rises to 4 feet from surface in some years.	Severe: subject to slumping below depth of 28 inches.
Arizo	Severe: subject to flooding and sedimentation.	Moderate: crossed by arroyos.	Severe: subject to occasional flooding.	Moderate: very gravelly.
Armijo: Au, AV, Aw, Ay	Severe: high shrink-swell potential; high compressibility.	Severe: high shrink-swell potential.	Severe: clayey; seasonal water table.	Moderate to severe: clayey; seasonal water table at depth of 4 to 5 feet.
Badland: BD	Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.	Moderate to severe: slope is 25 to 75 percent; erodible.
Belen: Be, Bf, Bg	Severe: high shrink-swell potential to depth of 31 inches.	Severe: high shrink-swell potential.	Severe: in places seasonal water table rises to 4 feet from surface in some years.	Moderate: seasonal water table at depth of 4 to 5 feet.

See footnote at end of table.

affecting use in town and country planning

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Lawns, shrubs, and golf fairways [2]	Camp areas	Picnic areas	Playgrounds	Paths and trials
Highly corrosive to untreated steel pipe where salt affected.	Slight to moderate: moderate where surface layer is loamy sand; subject to runoff from adjacent soils in places.	Slight: moderate where surface layer is loamy sand; subject to runoff from adjacent soils in places.	Slight to moderate: slope is more than 2 percent in places; surface layer is loamy sand in places.	Slight: moderate where surface layer is loamy sand.
Moderate: moderate available water capacity; sand at a depth below 30 inches.	Slight to moderate: clay loam surface layer is dusty when dry, muddy and sticky when wet.	Slight to moderate: clay loam surface layer is dusty when dry, muddy and sticky when wet.	Slight to moderate: clay loam surface layer is dusty when dry, muddy and sticky when wet.	Slight to moderate: clay loam surface layer is dusty when dry, muddy and sticky when wet.
Moderate: salt affected; water table at a depth of 2 to 4 feet; corrosive to untreated steel pipe.	Slight	Slight	Slight	Slight.
Moderate: moderate available water capacity; gravelly.	Slight	Slight	Moderate: slope is 2 to 8 percent in most places.	Slight.
Severe: bedrock at depth of 10 to 20 inches; many rock outcrops.	Moderate to severe: gravelly; slope is 1 to 50 percent.	Moderate to severe: gravelly; slope is 1 to 50 percent.	Severe: gravelly; slope is 1 to 50 percent.	Moderate to severe: gravelly; slope is 1 to 50 percent.
Moderate: low available water capacity; bedrock at depth of 20 to 40 inches.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate to severe: bedrock at depth of 20 to 40 inches; slope is 0 to 5 percent.	Moderate: loamy fine sand surface layer is subject to soil blowing.
Moderate: moderate available water capacity; moderately slow permeability to depth of 28 inches.	Moderate: dusty when dry, muddy and sticky when wet.	Moderate: dusty when dry, muddy and sticky when wet.	Moderate: dusty when dry, muddy and sticky when wet.	Moderate: dusty when dry, muddy and sticky when wet.
Moderate to severe: low available water capacity; very gravelly.	Moderate: very gravelly.	Moderate: very gravelly.	Severe: very gravelly	Moderate: very gravelly.
Moderate to severe: very slow intake rate and permeability; salt affected.	Severe: sticky and muddy when wet; ponded at times.	Severe: sticky and muddy when wet; ponded at times.	Severe: sticky and muddy when wet; ponded at times.	Severe: sticky and muddy when wet; ponded at times.
Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.	Severe: slope is 25 to 75 percent; erodible.
Moderate: very slow permeability; some tracts are salt affected.	Moderate: surface layer is mainly clay loam.	Moderate: surface layer is mainly clay loam.	Moderate: surface layer is mainly clay loam.	Moderate: surface layer is mainly clay loam.

TABLE 7.—*Limitations of the soils and soil features*

Soil series and map symbols	Homesites	Streets and parking lots in subdivisions	Sanitary landfills [1]	Excavations
*Bluepoint: BH, BK, Bm, Bn, BO, BP, Bs, BT. For Adelino part of BT, see Adelino series. For Wink part of Bs, see Wink series, unit Wk.	Slight: sandy surface layer is subject to soil blowing.	Slight	Moderate: loamy sand and loamy fine sand.	Severe: subject to slumping.
Br	Slight: moderate shrink-swell potential to a depth of 10 inches.	Slight	Moderate: loamy sand and loamy fine sand.	Severe: subject to slumping.
Brazito: Bu, Bv	Slight to moderate: water table is at a depth of 2 to 5 feet in places.	Slight to moderate: water table is at a depth of 2 to 5 feet in places.	Severe: seasonal water table at a depth of 2 to 5 feet or more.	Severe: subject to slumping.
Bw, Bx	Slight to moderate: moderate shrink-swell potential to a depth of 15 inches; water table is 5 feet or less from surface in places.	Slight to moderate: moderate shrink-swell potential to a depth of 15 inches; water table is 5 feet or less from surface in places.	Severe: seasonal water table at a depth of 2 to 5 feet or more.	Severe: subject to slumping.
*Caliza: Cb, CE For Bluepoint part, see Bluepoint series.	Moderate if slope is 5 to 10 percent; severe if 10 to 25 percent.	Moderate if slope is 5 to 10 percent; severe if 10 to 25 percent.	Moderate to severe: subject to severe erosion in steep areas.	Moderate: very gravelly.
*Deama: DL For Laporte part, see Laporte series.	Severe: slope is 15 to 50 percent; bedrock at depth of 9 to 20 inches.	Severe: slope is 15 50 percent; bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 to 20 inches.
*Dean: DP For Pinon part, see Pinon series.	Moderate: slow permeability.	Moderate: fair stability; slope is 5 to 7 percent in places.	Moderate to severe: bedrock at depth of 42 to more than 60 inches.	Moderate: bedrock at depth of 42 to more than 60 inches.
*Farb: FR For Rock outcrop part, see Rock outcrop.	Severe: bedrock at depth of 7 to 13 inches; slope is 5 to 15 percent.	Moderate to severe: slope is 5 to 15 percent.	Severe: bedrock at depth of 7 to 13 inches.	Severe: bedrock at depth of 7 to 13 inches.
Gila: Ga, Gd, Gk	Slight	Slight	Severe: in places seasonal water table at a depth of 4 feet in some years.	Slight
Gc, Ge, Gf, Gg, Gh, Gm, Gn	Moderate: water table at depth of 2 to 4 feet; corrosive to untreated steel pipe.	Moderate: water table at depth of 2 to 4 feet.	Severe: in places seasonal water table at a depth of 4 feet in some years.	Moderate: water table at a depth of 2 to 4 feet.

See footnotes at end of table.

affecting use in town and country planning—Continued

Lawns, shrubs, and golf fairways [2]	Camp areas	Picnic areas	Playgrounds	Paths and trials
Moderate: low available water capacity; rapid permeability.	Moderate: sandy surface layer is subject to soil blowing.	Moderate: sandy surface layer is subject to soil blowing.	Moderate: sandy surface layer is subject to soil blowing; severe where slope is more than 8 percent.	Moderate: sandy surface layer is subject to soil blowing.
Moderate: low available water capacity; rapid permeability below depth of 10 inches.	Slight	Slight	Slight to moderate: slope is 1 to 3 percent.	Slight.
Moderate to severe: low available water capacity; rapid permeability.	Moderate: subject to soil blowing.	Moderate: subject to soil blowing.	Moderate: subject to soil blowing.	Moderate: subject to soil blowing.
Moderate: low available water capacity; rapid permeability below depth of 15 inches.	Slight	Slight	Slight	Slight.
Severe: very gravelly; moderately rapid permeability; low available water capacity; moderately steep.	Moderate to severe: very gravelly; slope is 1 to 25 percent.	Moderate to severe: very gravelly; slope is 1 to 25 percent.	Severe: very gravelly; slope is 1 to 25 percent.	Moderate: very gravelly; slope is 1 to 25 percent.
Severe: bedrock at depth of 9 to 20 inches; steep.	Severe: slope is 15 to 50 percent.	Severe: slope is 15 to 50 percent.	Severe: slope is 15 to 50 percent.	Moderate to severe: slope is 15 to 50 percent.
Moderate: low available water capacity; high content of lime; slope is 5 to 7 percent.	Slight	Slight	Moderate: slope is 2 to 7 percent.	Slight.
Severe: bedrock at depth of 7 to 13 inches; low available water capacity.	Severe: rock outcrops	Moderate: rock outcrops.	Severe: rock outcrops; slope is 5 to 15 percent.	Moderate: rock outcrops.
Slight	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.
Moderate: salt affected; corrosive to steel pipe.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.	Slight to moderate: clay loam surface layer is muddy and sticky when wet; loamy fine sand surface layer is subject to soil blowing.

TABLE 7.—*Limitations of the soils and soil features*

Soil series and map symbols	Homesites	Streets and parking lots in subdivisions	Sanitary landfills [1]	Excavations
Glendale:				
Go, Gs	Moderate: moderate shrink-swell potential.	Severe: highly plastic; unstable.	Severe: in places seasonal water table at a depth of 4 feet in some years.	Slight
Gr, Gt	Moderate: moderate shrink-swell potential; water table at depth of 2 to 4 feet; corrosive to untreated steel pipe.	Severe: highly plastic; unstable.	Severe: seasonal water table at a depth of 2 to 4 feet; hazard of water pollution.	Moderate: water table at a depth of 2 to 4 feet.
Gullied land: GV	Severe: dissected by gullies.	Severe: dissected by gullies.	Severe: subject to severe erosion.	Slight
Hassell: HA	Moderate: moderate shrink-swell potential; slow permeability.	Moderate: unstable; plastic.	Severe: bedrock at depth of 3 to 5 feet.	Moderate to severe: bedrock at depth of 3 to 5 feet.
Ildefonso: ID	Severe: slope is 10 to 20 percent.	Severe: slope is 10 to 20 percent.	Moderate: moderately rapid permeability.	Moderate: stony
Laporte	Severe: slope is 15 to 50 percent; bedrock at depth of 9 to 17 inches.	Severe: slope is 15 to 50 percent; bedrock at depth of 9 to 17 inches.	Severe: bedrock at depth of 9 to 17 inches.	Severe: bedrock at depth of 9 to 17 inches.
Largo: La, LG, Lr	Moderate: moderate shrink-swell potential; subject to occasional flooding.	Moderate: unstable; erodible.	Severe: subject to occasional flooding.	Slight
Latene: LS, LV	Slight	Slight	Slight	Moderate: gravelly
*Madurez: Ma, Md, ME, Mf, MH, MK. For Bluepoint part of MH, see Bluepoint series, unit BO. For Wink part of MK, see Wink series, unit WU.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Slight	Slight
*Millett: ML For Tesajo part, see Tesajo series.	Slight to moderate: low shrink-swell potential below depth of 16 inches; slope is 1 to 9 percent.	Slight to moderate: slope is 1 to 9 percent.	Slight	Moderate: very gravelly below depth of 16 inches.
Mixed alluvial land: Mn	Severe: subject to flooding; high water table.	Severe: subject to flooding.	Severe: water table within 20 feet of surface; hazard of water pollution; subject to flooding.	Severe: subject to slumping.
*Nickel: NL For Latene part, see Latene series.	Moderate to severe: slope is 5 to 25 percent.	Moderate to severe: slope is 5 to 25 percent.	Moderate: slope is 5 to 25 percent; subject to erosion.	Moderate: very gravelly.

See footnotes at end of table.

affecting use in town and country planning—Continued

Lawns, shrubs, and golf fairways [2]	Camp areas	Picnic areas	Playgrounds	Paths and trials
Slight	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.
Moderate: salt affected; corrosive to steel pipe.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.	Slight where surface layer is loam; moderate if surface layer is clay loam; muddy and sticky when wet.
Severe: subject to severe erosion.	Severe: subject to occasional flooding and severe erosion.	Severe: subject to occasional flooding and severe erosion.	Severe: subject to occasional flooding and severe erosion.	Severe: subject to occasional flooding and severe erosion.
Moderate to severe: slow permeability; strongly alkaline.	Moderate: dusty when dry, muddy and sticky when wet.	Moderate: dusty when dry, muddy and sticky when wet.	Moderate: slope is 2 to 5 percent; muddy and sticky when wet.	Moderate: dusty when dry, muddy and sticky when wet.
Severe: moderately steep; very gravelly; low available water capacity.	Severe: stony; slope is 10 to 20 percent.	Moderate to severe: stony; slope is 10 to 20 percent.	Severe: slope is 10 to 20 percent.	Moderate: stony.
Severe: slope is 15 to 50 percent; bedrock at a depth of 9 to 17 inches.	Severe: slope is 15 to 50 percent.	Severe: slope is 15 to 50 percent.	Severe: slope is 15 to 50 percent.	Moderate to severe: slope is 15 to 50 percent; 15 to 35 percent gravel.
Slight	Slight to moderate: silty clay loam surface layer; dusty when dry, muddy and sticky when wet.	Slight to moderate: silty clay loam surface layer; dusty when dry, muddy and sticky when wet.	Slight to moderate: silty clay loam surface layer; dusty when dry, muddy and sticky when wet.	Slight to moderate: silty clay loam surface layer; dusty when dry, muddy and sticky when wet.
Moderate	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; slope is 1 to 10 percent.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; slope is 1 to 10 percent.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; slope is 1 to 10 percent.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; slope is 1 to 10 percent.
Slight to moderate: surface layer is erodible.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate: loamy fine sand surface layer is subject to soil blowing; slope is 0 to 5 percent.	Moderate: loamy fine sand surface layer is subject to soil blowing.
Moderate: very gravelly below depth of 16 inches; moderate available water capacity.	Slight	Slight	Slight to moderate: slope is 1 to 9 percent.	Slight.
Severe: subject to flooding.	Severe: subject to flooding.	Moderate to severe: subject to flooding.	Severe: subject to flooding.	Moderate to severe: subject to flooding.
Severe: very gravelly; low available water capacity; slope is 5 to 25 percent.	Moderate to severe: very gravelly; slope is 5 to 25 percent.	Moderate to severe: very gravelly; slope is 5 to 25 percent.	Moderate to severe: very gravelly; slope is 5 to 25 percent.	Moderate to severe: very gravelly; slope is 5 to 25 percent.

TABLE 7.—*Limitations of the soils and soil features*

Soil series and map symbols	Homesites	Streets and parking lots in subdivisions	Sanitary landfills [1]	Excavations
Pajarito: Pa, Pf, PH	Slight: a few gullies	Moderate: erodible	Severe: moderately rapid permeability; hazard of water pollution.	Slight
Pinon	Severe: bedrock at depth of 9 to 20 inches.	Moderate: moderately plastic; bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 to 20 inches.	Severe: bedrock at depth of 9 to 20 inches.
Riverwash: Rv	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding; hazard of water pollution.	Severe: subject to slumping.
Rock land: RW	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.
*Rock outcrop: RX, RZ For Akela part of RX, see Akela series.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.
Salas: SA	Severe: very stony; slope is 30 to 70 percent.	Severe: very stony; slope is 30 to 70 percent.	Severe: bedrock at depth of 20 to 40 inches.	Severe: bedrock at depth of 20 to 40 inches; slope is 30 to 70 percent.
Santa Fe: SF	Severe: very stony; slope is 25 to 70 percent.	Severe: very stony; slope is 25 to 70 percent.	Severe: bedrock at depth of 15 to 32 inches.	Severe: bedrock at depth of 15 to 32 inches.
Sedillo: SG, SL	Slight to moderate: slope is 3 to 9 percent.	Slight to moderate: slope is 3 to 9 percent.	Slight	Moderate: very gravelly or very stony.
Tesajo	Slight: a few gullies	Slight to moderate: slope is 1 to 9 percent.	Severe: rapid permeability; hazard of water pollution.	Moderate: very gravelly.
*Tome:				
TM, TN For Arizo part of TN, see Arizo series.	Severe: moderate shrink-swell potential; moderately slow permeability; occasional flooding.	Moderate: moderate shrink-swell potential.	Slight	Slight
TO, TR For Adelino part of TO, see Adelino series. For Armijo part of TR, see Armijo series.	Severe: moderate shrink-swell potential; moderately slow permeability; occasional flooding.	Moderate: moderate shrink-swell potential.	Moderate: silty clay loam.	Slight
*Tres Hermanos: Ts, TU For Madurez part of TU, see Madurez series.	Moderate: moderate shrink-swell potential in upper 17 inches.	Slight to moderate: moderately plastic in upper 17 inches.	Slight below depth of 17 inches.	Slight

See footnotes at end of table.

affecting use in town and country planning—Continued

Lawns, shrubs, and golf fairways [2]	Camp areas	Picnic areas	Playgrounds	Paths and trials
Moderate: sandy surface layer; erodible; moderately rapid permeability.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate: loamy fine sand surface layer is subject to soil blowing.	Moderate to severe: loamy fine sand surface layer is subject to soil blowing; slope is 0 to 5 percent.	Moderate: loamy fine sand surface layer is subject to soil blowing.
Moderate: bedrock at depth of 9 to 20 inches; low available water capacity.	Moderate: rock outcrops cover about 5 percent of surface; slope is 3 to 10 percent.	Slight to moderate: rock outcrops cover about 5 percent of surface; slope is 3 to 10 percent.	Severe: bedrock at depth of 9 to 20 inches; slope is 3 to 10 percent.	Slight.
Severe: subject to flooding and erosion.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.	Severe: bedrock at depth of 0 to 6 inches; slope is 25 to 80 percent.
Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.	Severe: bedrock at depth of 0 to 6 inches; slope is 10 to 100 percent; rock outcrops.
Severe: very stony; slope is 30 to 70 percent.	Severe: very stony; slope is 30 to 70 percent.	Severe: very stony; slope is 30 to 70 percent.	Severe: very stony; slope is 30 to 70 percent.	Severe: very stony; slope is 30 to 70 percent.
Severe: very stony; slope is 25 to 70 percent.	Severe: very stony; slope is 25 to 70 percent.	Severe: very stony; slope is 25 to 70 percent.	Severe: very stony; slope is 25 to 70 percent.	Severe: very stony; slope is 25 to 70 percent.
Moderate to severe: very gravelly or very stony; low available water capacity.	Moderate: very gravelly or very stony.	Moderate: very gravelly or very stony.	Severe: very gravelly or very stony.	Moderate: very gravelly or very stony.
Moderate to severe: very gravelly; low available water capacity.	Slight to moderate: very gravelly; slope is 1 to 9 percent.	Slight to moderate: very gravelly; slope is 1 to 9 percent.	Moderate to severe: very gravelly; slope is 1 to 9 percent.	Slight.
Slight	Slight: in places protection against runoff from adjacent soils is needed.	Slight: in places protection against runoff from adjacent soils is needed.	Slight: in places protection against runoff from adjacent soils is needed.	Slight.
Moderate: salt affected; moderately slow permeability; corrosive to untreated steel pipe.	Slight to moderate: very fine sandy loam to silty clay loam surface layer.	Slight to moderate: very fine sandy loam to silty clay loam surface layer.	Slight to moderate: very fine sandy loam to silty clay loam surface layer.	Slight to moderate: very fine sandy loam to silty clay loam surface layer.
Moderate: moderate available water capacity; gravelly substrata.	Slight	Slight	Slight to moderate: slope is 1 to 5 percent.	Slight.

TABLE 7.—*Limitations of the soils and soil features*

Soil series and map symbols	Homesites	Streets and parking lots in subdivisions	Sanitary landfills[1]	Excavations
Vinton:				
Vd, Vg, Vm	Slight: moderate shrink-swell potential to depth of 11 inches in some places.	Slight: surface layer is clay loam, about 11 inches thick, in some places.	Severe: in places seasonal water table within 4 feet of surface in some years.	Severe: subject to slumping.
Ve, Vf, Vh, Vk	Severe: water table at depth of 2 to 4 feet.	Moderate: water table at depth of 2 to 4 feet.	Severe: water table at depth of 2 to 4 feet; hazard of water pollution.	Severe: subject to slumping; water table at depth of 2 to 4 feet.
Vinton, loamy subsoil variant: Vn, Vo, Vt.	Slight: moderate shrink-swell potential to depth of 14 inches in some places.	Slight: surface layer is clay loam, about 14 inches thick, in some places.	Severe: in places seasonal water table within 4 feet of surface in some years.	Moderate: some layers are subject to slumping.
*Wink:				
Wk, Wn, WO, Wr, WU For Caliza part of Wr, see Caliza series. For Madurez part of WU, see Madurez series.	Slight	Slight to moderate: some A–2–6 material.	Slight	Slight
Wm	Moderate: slow permeability below depth of 46 inches.	Slight: A–6 or A–7 material below depth of 46 inches.	Moderate to severe: clay loam or clay below depth of 46 inches.	Slight
Wink, clayey subsoil variant: Ws.	Severe: high shrink-swell potential below depth of 31 inches; eroded.	Severe: eroded; high shrink-swell potential below depth of 31 inches.	Severe: clay loam or clay below depth of 31 inches; erodible.	Moderate: clay loam or clay below depth of 31 inches.

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[1] Onsite investigation of the underlying strata, depth to water table, and the hazard of pollution of water supplies should be made for landfills deeper than 5 or 6 feet.

affecting use in town and country planning—Continued

Lawns, shrubs, and golf fairways[2]	Camp areas	Picnic areas	Playgrounds	Paths and trials
Moderate: moderate available water capacity; moderately rapid permeability.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.
Moderate: salt affected; water table at depth of 2 to 4 feet; corrosive to untreated steel pipe.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.
Moderate: moderate available water capacity.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.	Slight to moderate: loamy fine sand surface layer is subject to soil blowing; clay loam surface layer is muddy and sticky when wet.
Moderate: sandy, erodible surface layer.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing; slope is 0 to 9 percent.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing.
Moderate: sandy, erodible surface layer; slow permeability below depth of 46 inches.	Moderate: subject to soil blowing.	Moderate: subject to soil blowing.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing; slope is 0 to 9 percent	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing.
Severe: corrosive to untreated steel pipe; clay loam or clay below depth of 31 inches.	Moderate: subject to soil blowing.	Moderate: subject to soil blowing.	Severe: slow permeability below depth of 31 inches.	Slight where surface layer is fine sandy loam; moderate where surface layer is loamy sand; subject to soil blowing.

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[2] Irrigation is essential for establishing and maintaining lawns, shrubs, and golf fairways. Native shrubs and grasses can be grown without irrigation.

Formation and Classification of the Soils

This section presents the outstanding morphologic characteristics of the soils of the survey area and relates them to the factors of soil formation. Physical and chemical data are limited for these soils, and the discussion of soil genesis and morphology is correspondingly incomplete. The first part of the section deals with the factors of soil formation, and the second with the classification of the soils.

Factors of Soil Formation

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agents. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time these forces have been active.

Climate and vegetation are the active factors of soil genesis. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body with genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that can be formed, and, in extreme cases, determines it almost entirely. Time, usually a long time, is needed for the formation of distinct horizons in soils.

The factors of soil genesis are so closely interrelated that few generalizations can be made regarding the effect of any one factor, because the effect of each is modified by the other four. Many of the processes of soil development are unknown.

Parent material

Parent material influences the texture, mineralogy, structure, reaction, and color of the soils. The differences in these soil properties, as well as others, can be related to differences in parent material.

The soils in the survey area formed in several kinds of parent material. Most of the soils formed in recent alluvium; old unconsolidated alluvium; alluvium modified by wind; alluvial fan and piedmont sediments; or material weathered from basalt, granite, schist, limestone, sandstone, and shale. All the soils have received varying amounts of wind-laid carbonates.

The recent alluvium occurs along the Rio Grande. The river has changed its course many times, and the pattern of deposition of sand, silt, and clay is complex. Conequently, the pattern of soils that have formed in sediment on the flood plain of the Rio Grande is complex. Brazito and Vinton soils formed in sandy alluvium; Agua and Anapra soils formed in loamy and silty alluvium deposited over sandy alluvium. Gila and Glendale soils ormed in loamy and silty alluvium. Belen and Armijo oils formed in clayey alluvium in oxbow lakes or slackwater areas. The flood plain has been protected from major flooding since about 1927, but irrigated cropland continually receives small quantities of sediment from silty irrigation water diverted from the Rio Grande.

Old unconsolidated alluvium is the major parent material in the survey area. Much of this alluvium is from the ancestral Rio Grande and its tributaries. Such soils as those of the Madurez and Wink series (fig. 24) formed in sandy to loamy alluvium. Caliza soils formed in sandy and gravelly alluvium. Soils of the Tome-Adelino association and the Nickel-Latene-Ildefonso association (fig. 25) formed in alluvium.

Sandy alluvium is often modified by wind, especially in the southwestern part of the United States. Bluepoint soils formed in sandy alluvium on the valley filling slopes along the Rio Grande and the Rio Puerco. Bluepoint soils also formed in sandy, wind-modified alluvium on piedmonts and mesas. Soils of the Madurez-Wink association, the Bluepoint-Wink-Madurez association, and the Tres Hermanos-Madurez-Agustin association (fig. 26) are generally along the Rio Grande.

Alluvial fan sediment and piedmont sediments occur along the Manzano Mountains. Sedillo and Tres Hermanos soils formed in mixed gravelly alluvium. Agustin soils formed in loamy and gravelly alluvium, washed mainly from granite.

Several volcanic mountains and basalt flows occur in the north-central part of the survey area. A typical pattern of soils in the north-central part of the survey area (fig. 27) contains soils of the Bluepoint-Wink-Madurez association, the Rock outcrop-Akela-Alemeda association, and the Wink-Madurez association. Akela and Alemeda soils formed in material weathered from basalt, somewhat modified by wind-laid sediment.

The Manzano Mountains are made up of folded igneous, metamorphic, and sedimentary rocks. Santa Fe soils formed in material weathered from granite. Salas soils formed in material weathered mainly from schist and from gneiss and quartzite. Soils of the Laporte, Deama, and Pinon series formed in material weathered from limestone. Hassell soils formed in material weathered from interbedded shale and sandstone.

Most of the soils in this survey area contain mixed clay minerals of montmorillonite, vermiculite, mica-illite, kaolinite, quartz, and chlorite. Armijo and Belen soils formed in clayey alluvium; they are dominantly montmorillonitic clay.

Climate

The Eastern part of Valencia County has an arid, continental climate. In most of the survey area, the average annual precipitation is 7 to 10 inches. In the Manzano Mountains and the adjacent foothills, the precipitation is 10 to 14 inches a year. The average annual air temperature ranges from 50° F. in the Manzano Mountains to 60° in the Rio Grande valley.

Climate directly influences soil formation through the effect of precipitation and temperature on the kind and amount of vegetation and the weathering of parent material. Precipitation affects the leaching of bases and the movement of clay colloids in the soil. In warmer climates organic matter decomposes more rapidly than in cold climates. Parent material weathers more rapidly in warmer, more moist climates.

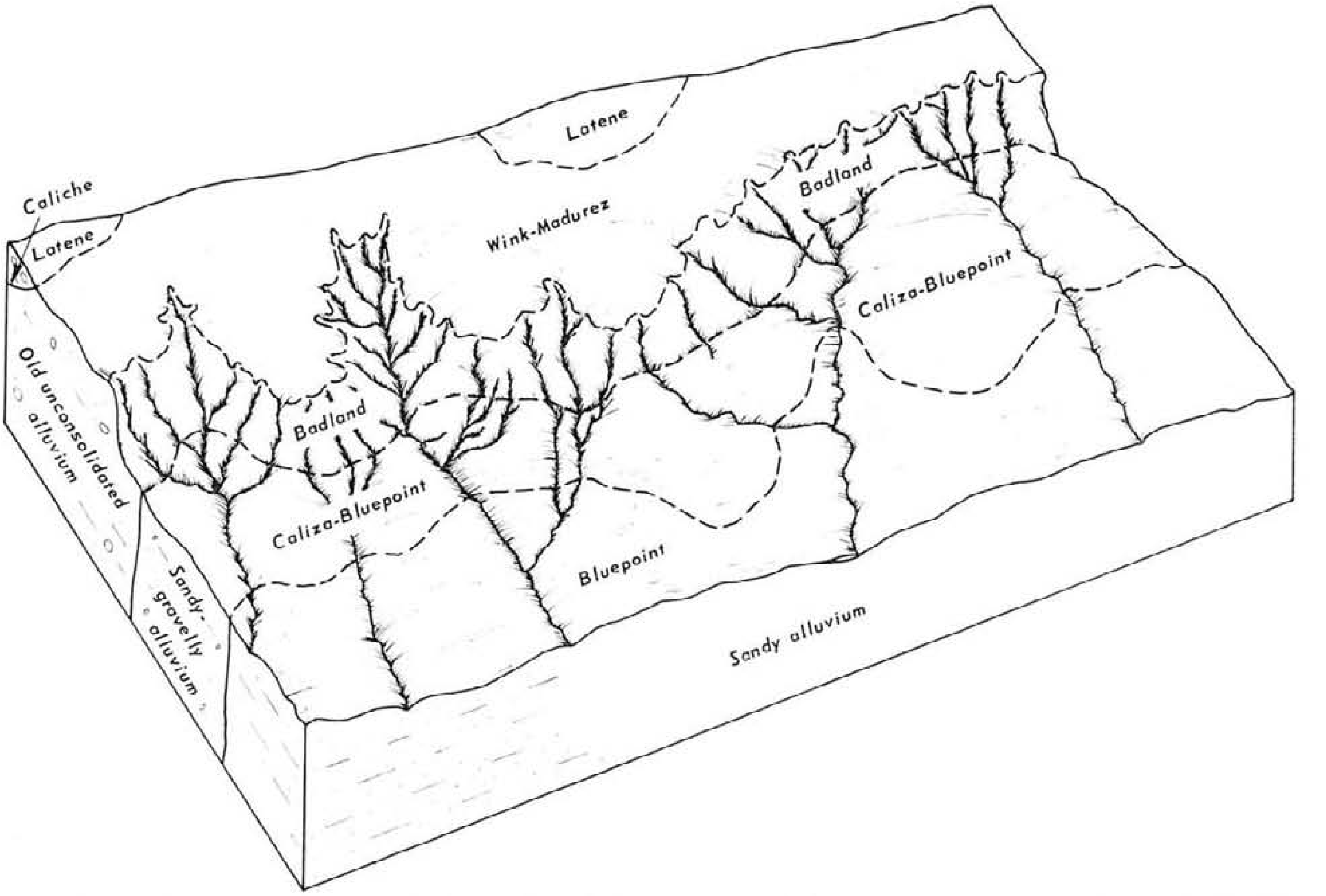

Figure 24.—Typical pattern of soils west of the Rio Grande. These soils are mainly in the Wink-Madurez association, the Badland-Rock outcrop and Landslides association, the Caliza-Bluepoint association, and the Bluepoint association.

The arid climate of this survey area is a primary factor that contributes to the sparse grassland type of vegetation in much of the area. Many of the soils, such as those of the Madurez and Wink series, have a light-colored surface layer that contains about 0.25 percent organic matter. In the Manzano Mountains the vegetation is a thicker stand of grasses and scattered trees and shrubs. Soils such as those of the Deama and Salas series formed under this kind of vegetation and have a dark-colored surface layer that contains more than 1 percent organic matter.

Most of the soils have slight to distinct zones of calcium carbonate. The Madurez and Wink soils formed where the average annual precipitation is 7 to 10 inches. They are moderately alkaline and have moderate to strong (15 to 30 percent calcium carbonate equivalent) zones of calcium carbonate below depths of 20 inches. The Salas soils formed where the average annual precipitation is 10 to 14 inches. They are mildly to moderately alkaline and have thin zones of calcium carbonate. The Salas soils are more strongly developed and show more movement of clay into the B2t horizon than Madurez or Wink soils.

Basalt and limestone weather fairly rapidly in a humid climate, but these kinds of bedrock are resistant to weathering in arid regions. The Akela soils are shallow to basalt, and the Deama, Laporte, and Pinon soils are shallow to limestone.

Plant and animal life

Plants and animals are active factors of soil formation. Vegetation, mainly grass, is the most important of these factors in this survey area. Plant roots grow down into the parent material, break up the soil, rearrange soil particles, force openings into the soil, and make the soil more porous. They also bring plant nutrients from the lower horizons to the upper horizons. Caliza and Latene soils formed under a sparse stand of grass. These soils have a light-colored surface layer that is low in organic-matter content. The Deama and Salas soils formed under a moderate stand of grass. These soils have a dark-colored surface layer that has a moderate content of organic matter.

Animals burrow in the soil and mix it. Earthworms, bacteria, and fungi live in the soil, feed on the organic matter, and recycle plant nutrients. The organic matter

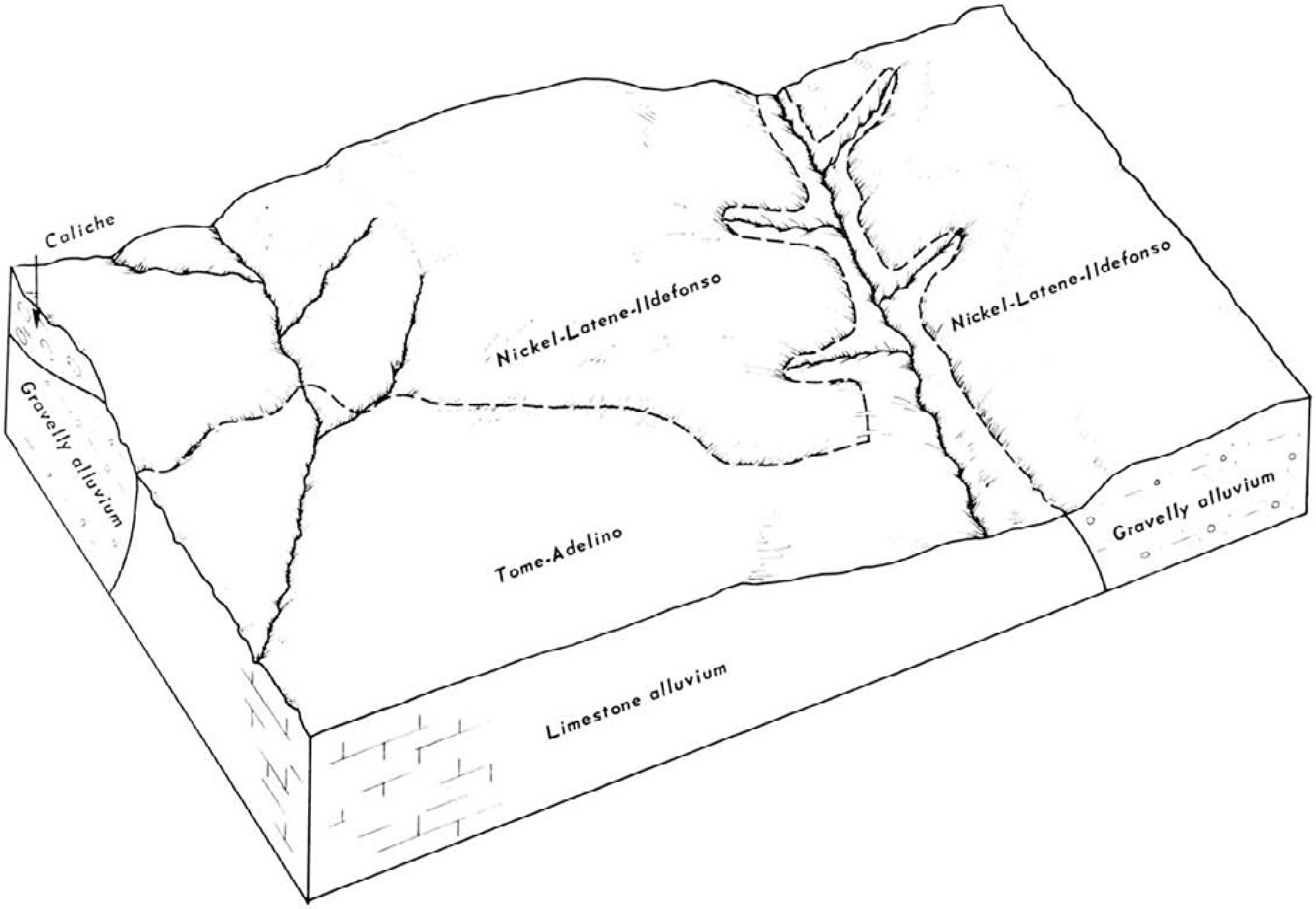

Figure 25.—**Typical pattern of soils in the eastern part of the survey area. These soils are mainly in the Tome-Adelino association and the Nickel-Latene-Ildefonso association.**

in the soil comes from the decay of dead plants and animals.

Man alters the soil by leveling the land, tilling the soil, planting and irrigating different kinds of crops, and controlling floodwaters. His activities are apparent in the Rio Grande valley, where soils of the Agua, Anapra, Belen, Brazito, Gila, Glendale, and Vinton series are used for irrigated crops.

Relief

Relief is the shape of the landscape, or differences in elevations of a land surface. It influences soil formation in its effect on surface runoff, drainage, erosion, and soil temperature. Variations in these factors cause differences in the thickness of the surface layer and of the solum, the degree of horizon differentiation, and the nature of the parent material.

This survey area has a wide range in relief. Slopes are less than 1 percent in the Rio Grande valley, and elevations are 4,750 to 4,950 feet. Slopes are mainly 15 to 75 percent in the Manzano Mountains, and elevations are 6,000 to 8,000 feet. Throughout the survey area, slopes are dominantly 1 to 9 percent, and elevations are dominantly 5,000 to 5,700 feet.

The variations in relief have affected soil formation. For example, the average depth to the water table under the Rio Grande flood plain is 7 to 9 feet, but it ranges from about 2 feet to 18 feet. The water table has been responsible, in part, for the saline and alkali conditions that affect about 25 percent of the soils on the Rio Grande flood plain.

The Madurez and Wink soils are geographically associated in most places. Commonly, the Madurez soils are slightly concave, and the Wink soils are slightly convex. As a result, the Madurez soils receive a little more moisture than Wink soils, and they have a stronger degree of horizon differentiation.

The Deama and Laporte soils are in the foothills of the Manzano Mountains, and their slope is 15 to 50 percent. These soils are gravelly and shallow to limestone bedrock. Geologic erosion nearly keeps up with the weathering of the bedrock.

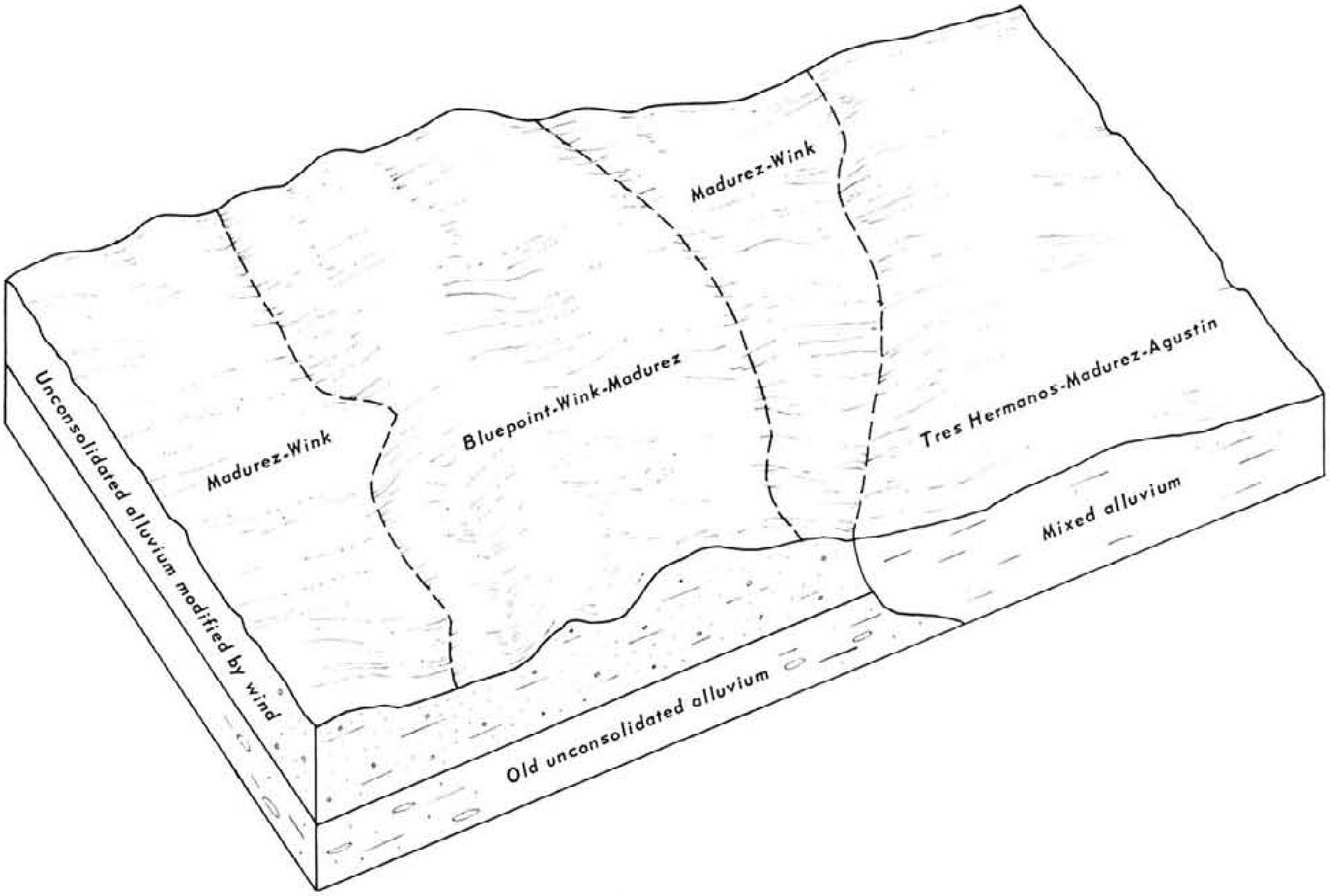
Madurez-Wink
Madurez-Wink
Bluepoint-Wink-Madurez
Tres Hermanos-Madurez-Agustin
Mixed alluvium
Unconsolidated alluvium modified by wind
Old unconsolidated alluvium

Figure 26.—Typical pattern of soils east of the Rio Grande. These soils are mainly in the Madurez-Wink association, the Bluepoint-Wink-Madurez association, and the Tres Hermanos-Madurez-Agustin association.

Time

Time is required for the active factors of soil formation to form soils from parent material. The length of time needed for a particular kind of soil to form is dependent on the other factors involved. The soils of the survey area range from young soils that have little or no horizonation to older soils that have distinct horizonation.

The Gila and Glendale soils are examples of young soils. These soils formed in stratified, calcareous, loamy and silty sediment on the flood plain of the Rio Grande. They retain most of the characteristics of the parent material, except for a slightly darker colored surface layer and some weak structure, rather than thin platy stratification.

The Sedillo soils are older soils that formed in light-brown, calcareous gravelly sandy loam. They are leached of carbonates to a depth of about 16 inches. They have a well-developed B2t horizon of reddish-brown very gravelly clay loam.

Classification of the Soils

Classification consists of an orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships. Classification is useful in organizing and applying the results of experience and research. Soils are placed in narrow classes for discussion in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped into progressively fewer and broader classes in successively higher categories (*5*), so that information can be applied to large geographic areas.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*8*). The system currently used by the National Cooperative Soil Survey was developed in the early sixties (*7*) and was adopted in 1965 (*11*). Table 8 in this section shows the classification of each soil series of the East Valencia Area by family, subgroup, and order according to this system.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together (*3*). The placement of some soil

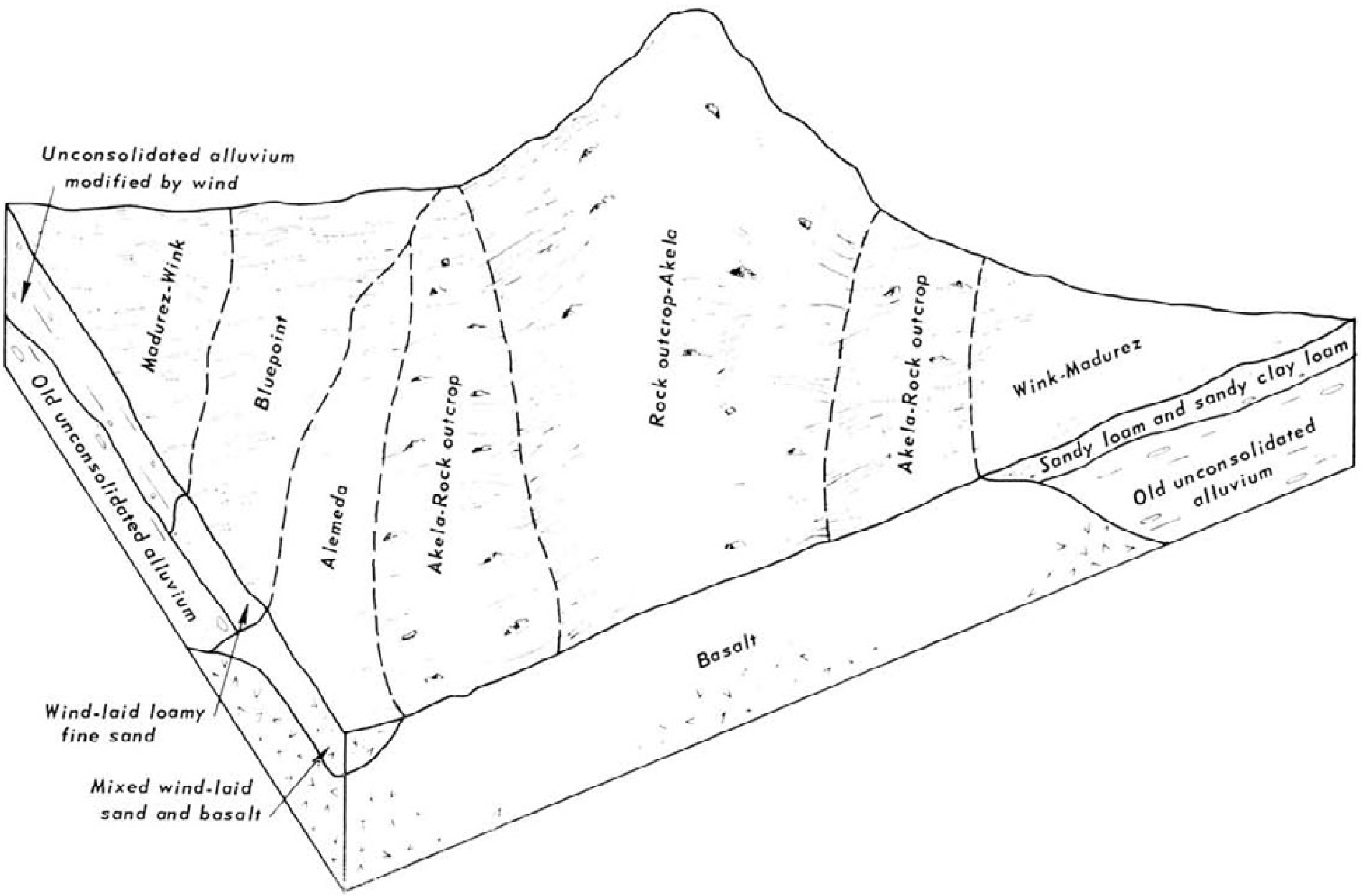
Unconsolidated alluvium modified by wind
Madurez-Wink
Bluepoint
Alemeda
Akela-Rock outcrop
Rock outcrop-Akela
Akela-Rock outcrop
Wink-Madurez
Sandy loam and sandy clay loam
Old unconsolidated alluvium
Old unconsolidated alluvium
Basalt
Wind-laid loamy fine sand
Mixed wind-laid sand and basalt

Figure 27.—Typical pattern of soils in the north-central part of Valencia County, Eastern Part. These soils are mainly in the Bluepoint-Wink-Madurez association, the Rock outcrop-Akela-Almeda association, and the Wink-Madurez association.

series in the current system of classification, particularly in families, may change as more precise information becomes available. The soil orders represented in this survey area are Aridisols, Entisols, Mollisols, and Vertisols.

Aridisols occur throughout most of the survey area. These are soils that have light-colored ochric epipedons and argillic, calcic, or cambic horizons. They are dry much of the time.

Haplargids are Aridisols that have argillic horizons. Tres Hermanos and Madurez soils are Typic Haplargids. Ustollic Haplargids are somewhat more moist than Typic Haplargids; Hassell, Sedillo, and Millett soils are in this subgroup.

Calciorthids are Aridisols that have calcic horizons but lack argillic horizons. Alemeda, Caliza, Latene, Nickel, and Wink soils are Typic Calciorthids. Ustollic Calciorthids are somewhat more moist than Typic Calciorthids; Dean and Ildefonso soils are in this subgroup. Lithic Ustollic Calciorthids are also more moist than Typic Calciorthids, and, in addition, they have bedrock within 20 inches of the surface; Pinon soils are in this subgroup.

Camborthids are Aridisols that have cambic horizons. Adelino, Agustin, and Pajarito soils are Typic Camborthids.

Entisols are recent soils that lack diagnostic horizons other than an ochric epipedon. Torrifluvents are warm, dry Entisols that have stratified sediments; their organic-matter content irregularly decreases with depth. Agua, Anapra, Gila, Glendale, and Vinton soils are Typic Torrifluvents. Belen soils are Vertic Torrifluvents. These are soils that contain a large amount of swelling clay.

Torriorthents are warm, dry Entisols. Their organic-matter content regularly decreases with depth. Arizo, Largo, and Tome soils are Typic Torriorthents. Lithic Torriorthents have bedrock within 20 inches of the surface. Akela and Farb soils are in this subgroup.

Torripsamments are warm, dry, sandy Entisols. Bluepoint and Brazito soils are Typic Torripsamments.

Mollisols are rich in bases and are mostly very dark colored soils. Argiustolls are somewhat dry Mollisols that have argillic horizons. Salas soils are Aridic Argiustolls; they are drier than Typic Argiustolls. Santa Fe soils are Lithic Argiustolls; these soils have bedrock within 20 inches of the surface.

Calciustolls are somewhat dry Mollisols that have calcic horizons, but lack argillic horizons. Deama soils are Lithic Calciustolls; they have bedrock within 20 inches of the surface.

TABLE 8.—*Classification of soil series by higher categories*

Series	Family	Subgroup	Order
Adelino	Fine-loamy, mixed, thermic	Typic Camborthids	Aridisols.
Agua	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), thermic.	Typic Torrifluvents	Entisols.
Agustin	Coarse-loamy, mixed, thermic	Typic Camborthids	Aridisols.
Akela	Loamy-skeletal, mixed (calcareous), thermic	Lithic Torriorthents	Entisols.
Alemeda	Loamy-skeletal, mixed, thermic	Typic Calciorthids	Aridisols.
Anapra [1]	Fine-silty over sandy or sandy-skeletal, mixed (calcareous), thermic.	Typic Torrifluvents	Entisols.
Arizo	Sandy-skeletal, mixed, thermic	Typic Torriorthents	Entisols.
Armijo	Fine, montmorillonitic, thermic	Typic Torrerts	Vertisols.
Belen	Clayey over loamy, montmorillonitic (calcareous), thermic.	Vertic Torrifluvents	Entisols.
Bluepoint	Mixed, thermic	Typic Torripsamments	Entisols.
Brazito	Mixed, thermic	Typic Torripsamments	Entisols.
Caliza	Sandy-skeletal, mixed, thermic	Typic Calciorthids	Aridisols.
Deama	Loamy-skeletal, carbonatic, mesic	Lithic Calciustolls	Mollisols.
Dean	Fine-loamy, carbonatic, mesic	Ustollic Calciorthids	Aridisols.
Farb	Loamy, mixed (calcareous), mesic	Lithic Torriorthents	Entisols.
Gila [2]	Coarse-loamy, mixed (calcareous), thermic	Typic Torrifluvents	Entisols.
Glendale	Fine-silty, mixed (calcareous), thermic	Typic Torrifluvents	Entisols.
Hassell	Fine, mixed, thermic	Ustollic Haplargids	Aridisols.
Ildefonso	Loamy-skeletal, mixed, mesic	Ustollic Calciorthids	Aridisols.
Laporte	Loamy, mixed, mesic	Lithic Haplustolls	Mollisols.
Largo	Fine-silty, mixed (calcareous), thermic	Typic Torriorthents	Entisols.
Latene	Coarse-loamy, mixed, thermic	Typic Calciorthids	Aridisols.
Madurez [3]	Fine-loamy, mixed, thermic	Typic Haplargids	Aridisols.
Millett	Fine-loamy, mixed, mesic	Ustollic Haplargids	Aridisols.
Nickel	Loamy-skeletal, mixed, thermic	Typic Calciorthids	Aridisols.
Pajarito	Coarse-loamy, mixed, thermic	Typic Camborthids	Aridisols.
Pinon	Loamy, mixed, mesic	Lithic Ustollic Calciorthids	Aridisols.
Salas	Loamy-skeletal, mixed, mesic	Aridic Argiustolls	Mollisols.
Santa Fe [4]	Loamy-skeletal, mixed, mesic	Lithic Argiustolls	Mollisols.
Sedillo	Loamy-skeletal, mixed, mesic	Ustollic Haplargids	Aridisols.
Tesajo	Loamy-skeletal, mixed, mesic	Cumulic Haplustolls	Mollisols.
Tome	Fine-silty, mixed (calcareous), thermic	Typic Torriorthents	Entisols.
Tres Hermanos	Fine-loamy, mixed, thermic	Typic Haplargids	Aridisols.
Vinton	Sandy, mixed, thermic	Typic Torrifluvents	Entisols.
Vinton, loamy subsoil variant.	Sandy over loamy, mixed, thermic	Typic Torrifluvents	Entisols.
Wink	Coarse-loamy, mixed, thermic	Typic Calciorthids	Aridisols.
Wink, clayey subsoil variant.	Coarse-loamy over clayey, mixed, thermic	Typic Calciorthids	Aridisols.

[1] Some of these soils are taxadjuncts to the Anapra series because they have hues of 5YR.

[2] Some of these soils are taxadjuncts to the Gila series because they have 18 to 24 percent clay, more than is defined in the range for the series.

[3] Some of these soils are taxadjuncts to the Madurez series because they have a Clca horizon that has less lime than is defined in the range for the series.

[4] These soils are taxadjuncts to the Santa Fe series because they have bedrock a few inches deeper than is defined in the range for the series.

Haplustolls are also somewhat dry Mollisols. Laporte soils are Lithic Haplustolls; they have bedrock within 20 inches of the surface. Tesajo soils are Cumulic Haplustolls; these soils have mollic epipedons more than 20 inches thick, and their organic-matter content irregularly decreases with depth.

Vertisols are soils that contain 30 percent or more clay. They have cracks that are open to the surface and are at least three-eighths of an inch wide at a depth of 20 inches. The only Vertisols in this survey area are the Armijo soils. These soils are Typic Torrerts.

General Nature of the Area

This section gives general information about the survey area. It discusses the settlement and farming history; the physiography, relief, and drainage; and the climate.

Settlement and Farming History

Culturally, the Eastern part of Valencia County is a blend of three cultures—the native Indian, the early Spanish, and the later American and European. The early inhabitants were Pueblo Indians. When Coronado, the early Spanish explorer, first came to this area in 1540, he found the Indians living in adobe houses along the Rio Grande. The Indians cultivated fertile, irrigated fields of corn and beans.

The first Spanish settlement was established in 1598. The San Antonio de Isleta Mission was founded in 1609, just north of the Valencia County line. The Spanish were driven out of New Mexico by the Indians in 1680, but they returned in 1692.

The village of Tome became a permanent settlement in 1739. It was the county seat at various times until 1872. Many of the Spanish villages, especially Tome, were frequently raided by Apache Indians until about 1890.

Belen was established in 1740. Early names for the settlement were Bethel, Bethlehem, and Nuestra Senora de Belen (*4*). Los Lunas was established during the early Spanish settlement and was named for the Luna family. It has been the county seat since 1876.

The Spanish territory that included the survey area came under Mexican rule in 1822. The territory became a United States possession in 1846. New Mexico became a State in 1912.

Between 1850 and 1870 a number of settlers came to the East Valencia Area from Germany and France. These people soon became leading businessmen and ranchers.

The population is concentrated along the Rio Grande in a strip about 4 miles wide and 26 miles long. Ranch headquarters are scattered throughout the Area. Belen has a population of about 5,000, and Los Lunas, one of about 1,800. Belen became the railroad center of New Mexico in 1907. It is the hub of the main east-west line and north-south line of the Atchison, Topeka, & Santa Fe Railway.

In recent years land developments have been built on the mesas and piedmonts east and west of the Rio Grande. These developments are mainly on soils that have few limitations for community development.

In the latter part of the nineteenth century, squash, melons, beans, fruit, wheat, chili, and corn were the principal cultivated crops. At the present time, the major irrigated crops are alfalfa and permanent pasture. Smaller acreages are used for corn, barley, wheat, sorghum, chili, lettuce, and fruit orchards.

Physiography, Relief, and Drainage

The survey area is in the Mexican Highland section of the Basin and Range Physiographic Province (*9*). The area is a physiographic trough (the Rio Grande graben), about 35 miles wide, and is bordered by the Manzano Mountains on the east and the Lucero uplift on the extreme west.

The Rio Grande graben contains several thousand feet of poorly consolidated sediment of the Santa Fe Group, of middle Miocene to Pleistocene age. The Rio Grande occupies a valley entrenched into the Santa Fe Group through the central part of the graben. The Rio Grande flood plain is underlain by recent alluvium deposited by the river and is as much as 120 feet thick in places. East of the Rio Grande are several terraces formed by successive stages of downcutting by the ancient Rio Grande. The terraces range from 120 to 340 feet above the present level of the river.

The Manzano Mountains in the East Valencia Area have elevations of about 6,000 to 8,500 feet. These mountains consist of granitic igneous rocks of Precambrian age and metamorphic rocks of schist, gneiss, and quartzite on the rugged west face. In the southeastern corner of the survey area, the Manzano foothills consist of Madera limestone of Pennsylvanian age, San Andres limestone, Glorieta sandstone, and Abo red shale and sandstone of Permian age.

West of the Manzano Mountains is a bajada, or piedmont, consisting of coalescing alluvial fans. The major sediment deposition is within a mile or so of the mountains. The arroyos or stream channels become smaller to the west and disappear within 6 to 10 miles from the foot of the mountains.

The soils east of the Rio Grande are gently sloping to undulating. The topography consists of broad, shallow, closed depressions; and wide, poorly defined terraces. These features are probably remnants of channels that once contained the ancestral Rio Grande (*9*). Caliche underlies many of the soils, such as those of the Madurez and Wink series. Locally, there is a cover of wind-laid sand.

The Llano de Albuquerque is a long, narrow mesa west of the Rio Grande. Its land surface is very similar to that directly east of the Rio Grande. The surface of the mesa is about 400 to 450 feet above the flood plain. The margins of the mesa are cut by steep-walled arroyos. The surface of the Llano de Albuquerque developed in late Pliocene to Pleistocene time.

The Rio Puerco valley is west of the Llano de Albuquerque. It has a broad, flat floor into which the Rio Puerco was incised 40 feet or more in the latter part of the seventeenth century (*9*).

The valley west of the Rio Puerco slopes upward to the Luerco uplift. The land surface of the Rio Puerco valley rises about 800 feet within 2 or 3 miles to the flat top of the basalt-capped Mesa Carrizo. The western boundary of the survey area nearly coincides with the Rio Puerco fault zone. Local deposits of travertine cover many traces of the faults.

Volcanic rock of Quaternary age occurs in several isolated mountains, such as Cerro Tome, El Cerro de Los Lunas, Hidden Mountain, and Mesa Carrizo. A more extensive area of volcanic rock is in the north-central part of the survey area on the Llano de Albuquerque.

The survey area is drained by the Rio Grande and the Rio Puerco. Frequent flooding in the Tome area in the late nineteenth century is noted in the diary of Father Railliere, a French priest (*4*). The Catholic mission in Belen was destroyed by floods from the Rio Grande in 1854. Leves along the Rio Grande, built about 1927, have prevented major flooding from the river. The Middle Rio Grande Conservation District maintains drainage ditches and a system of irrigation canals and laterals.

The Rio Puerco joins the Rio Grande in Socorro County, about 12 miles south of Valencia County. Hell Canyon Wash is the only arroyo in the survey area that extends from the Manzano Mountains to the Rio Grande. All other arroyos that drain the west side of the mountains disappear between the mountain front and the Rio Grande valley. Several canyons in the southeastern corner of the area drain into the Abo Arroyo in Socorro County. The Abo Arroyo roughly parallels the Socorro-Valencia County line from the Manzano Mountains to the Rio Grande.

Climate[6]

The Rio Grande flows north to south through the eastern part of Valencia County. The land rises a few hundred feet on both sides of the narrow valley to wider mesas, and then rises more sharply in the foothills of the Manzano Mountains to the east. The temperature and precipitation at Los Lunas, shown in table 9, are representative of the valley and adjacent mesas. Lower temperatures and greater precipitation occur in the foothills of the mountains. The temperature occasionally reaches 100° F. or higher or falls to zero or below, but not in all years.

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[6] By FRANK E. HOUGHTON, climatologist for New Mexico, National Weather Service, U.S. Department of Commerce.

The growing season is about 5½ months long. The probabilities of selected temperatures in spring and in fall are shown in table 10. These generally apply to the valley and nearby mesas.

The survey area has an arid climate. The average annual precipitation ranges from 7 to 10 inches, except in the foothills of the Manzano Mountains, where it is about 12 inches. Although an average of only 1 day a year has more than half an inch of precipitation, these infrequent, brief, heavy showers may bring 1 to 1½ inches of rain, except in the dry winter season. Occasionally, hail accompanies summer thunderstorms.

In winter moisture is brought in from the Pacific Ocean, but most of the moisture in the eastward-moving storms falls as the storms pass over the high western mountains. In summer moisture is brought in from the Gulf of Mexico. The southeasterly circulation about high-pressure systems predominates late in spring and in summer.

The average annual snowfall is less than 5 inches in the survey area, except in the foothills, where it is somewhat higher. Snowfall seldom exceeds 1 or 2 inches and generally melts in a few hours.

Clear, sunny weather with low relative humidity and a wide range in daily temperatures is characteristic of the continental type of climate of this survey area. The skies are sunny more than three-fourths of the daylight hours. The relative humidity averages less than 50 percent. It is generally less than 20 percent on hot, sunny afternoons.

The direction of surface winds is controlled mainly by the topography of the valley. In winter the prevailing winds are northerly, and in summer the prevailing winds are southerly. Windspeed averages nearly 10 miles per hour for the year; winds are stronger late in winter and in spring. When the soils are dry, these stronger winds occasionally cause periods of blowing dust.

The highest recorded temperature in the survey area was 109° F at Belen. The lowest was −25° at Los Lunas on January 7, 1971.

Evaporation from a Class A measuring pan is estimated at 95 inches in an average year. Evaporation during the growing season, May through October, is more than 75 inches.

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TABLE 9.—*Temperature and precipitation data*

[All data from Los Lunas. Periods of record 1939–40 and 1949–67]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Average number of days that have precipitation of—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	0.10 inch or more	0.25 inch or more
	°F	°F	°F	°F	Inches	Inches	Inches		
January	49	17	61	4	0.3	(1)	0.6	1	(2)
February	53	22	68	10	.3	(1)	.8	1	(2)
March	63	28	75	16	.4	(1)	.8	1	1
April	73	36	84	25	.4	(1)	.9	1	1
May	81	44	91	34	.5	(1)	1.1	1	1
June	91	51	98	43	.7	(1)	1.5	2	1
July	93	60	99	53	1.0	0.4	1.9	2	1
August	91	58	97	51	1.2	.3	2.6	3	2
September	84	50	92	38	.9	(1)	1.8	2	1
October	74	37	83	26	.7	(1)	1.6	2	1
November	60	24	71	13	.3	(1)	.7	1	(2)
December	50	18	62	7	.4	(1)	.8	1	1
Year	72	37	[3] 101	[4] 0	7.1	4.8	10.2	18	10

[1] Less than 0.05 inch. [2] Less than half a day. [3] Average annual maximum temperature. [4] Average annual minimum temperature.

TABLE 10.—*Probabilities of selected temperatures in spring and in fall*

[All data from Los Lunas. Data for temperature levels 16° F. through 32° F. are from the period of record 1926–55; data for temperature levels 36° F. and 40° F. are from the periods of record 1939–40 and 1949–67]

Probability	Dates for given probability and temperature						
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower	36° F or lower	40° F or lower
Spring:							
1 year in 10 later than.	March 30	April 9	April 15	April 30	May 15	May 26	June 12
2 years in 10 later than.	March 26	April 4	April 12	April 26	May 12	May 22	June 8
5 years in 10 later than.	March 15	March 24	April 3	April 16	May 2	May 12	May 30
Fall:							
1 year in 10 earlier than.	November 7	October 28	October 23	October 16	October 5	September 19	September 10
2 years in 10 earlier than.	November 12	November 2	October 27	October 19	October 9	September 24	September 15
5 years in 10 earlier than.	November 22	November 11	November 3	October 25	October 16	October 3	September 25

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Glossary

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that the growth of most crop plants is low from this cause.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Buried soil. A developed soil, once exposed but now overlain by more recently formed soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperate areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Dispersion, soil. Deflocculation of the soil and its suspension in water.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Forb. Any herbaceous plant, neither a grass nor a sedge, that is grazed on western ranges.

Gravelly soil material. From 15 to 50 percent of material, by volume, consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Half-Shrub. A perennial plant that has a woody base and whose annually produced stems die back each year.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Lacustrine deposit (geology). Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Percolation. The downward movement of water through the soil.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Runoff (hydraulics). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Shale. A sedimentary rock formed by the hardening of clay deposits.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Variant, soil. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

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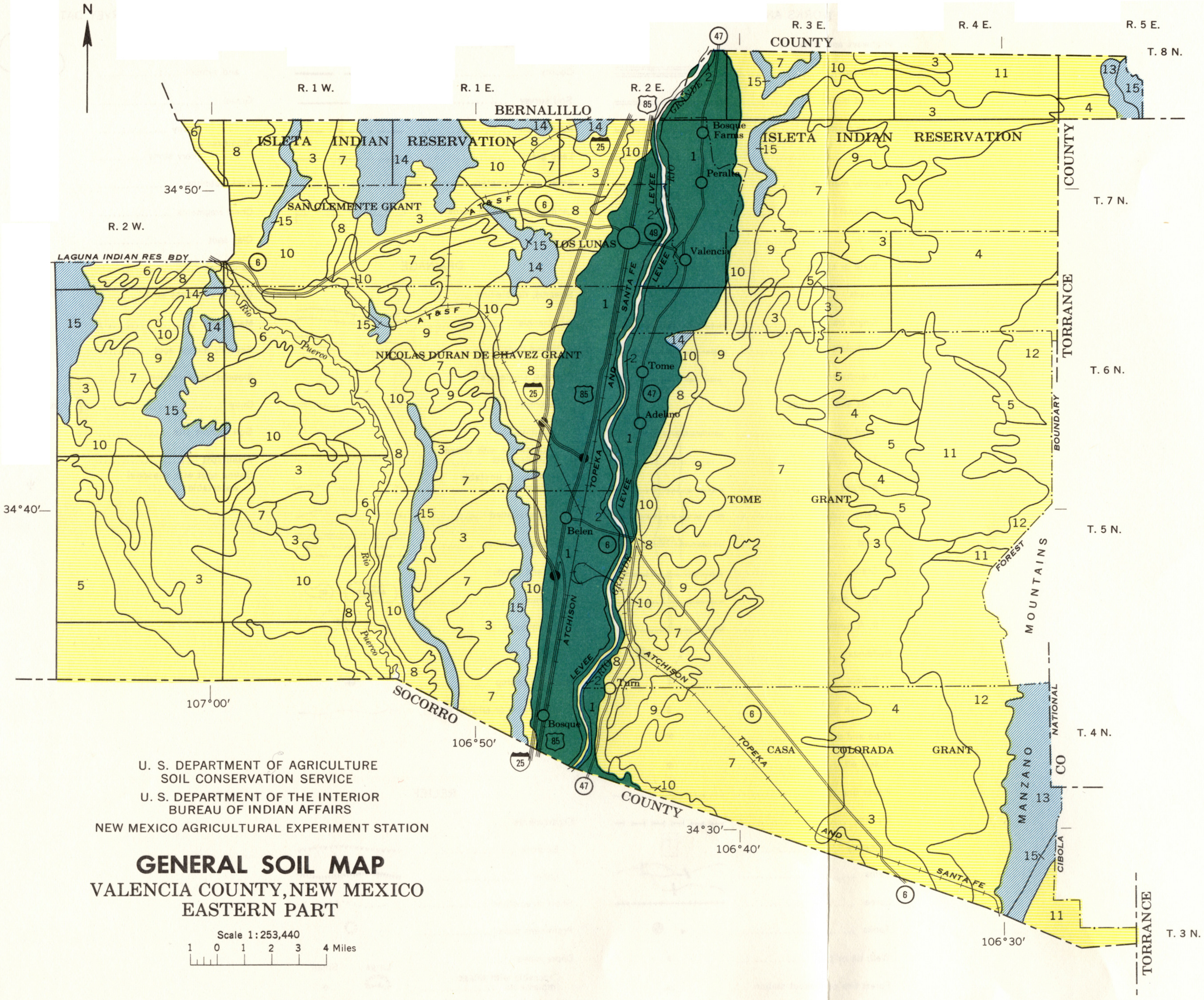


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
VALENCIA COUNTY, NEW MEXICO
EASTERN PART

Scale 1:253,440

1 0 1 2 3 4 Miles

SOIL ASSOCIATIONS

SOILS MORE THAN 5 FEET DEEP TO BEDROCK: ON THE RIO GRANDE FLOOD PLAIN

1	Gila-Vinton-Agua association: Level, well-drained loamy soils
2	Mixed alluvial land-Riverwash association: Nearly level, stratified clayey to sandy alluvium that has a fluctuating water table and is frequently reached by stream overflow

SOILS MORE THAN 5 FEET DEEP TO BEDROCK; ON ALLUVIAL FANS, MESAS, AND TERRACES

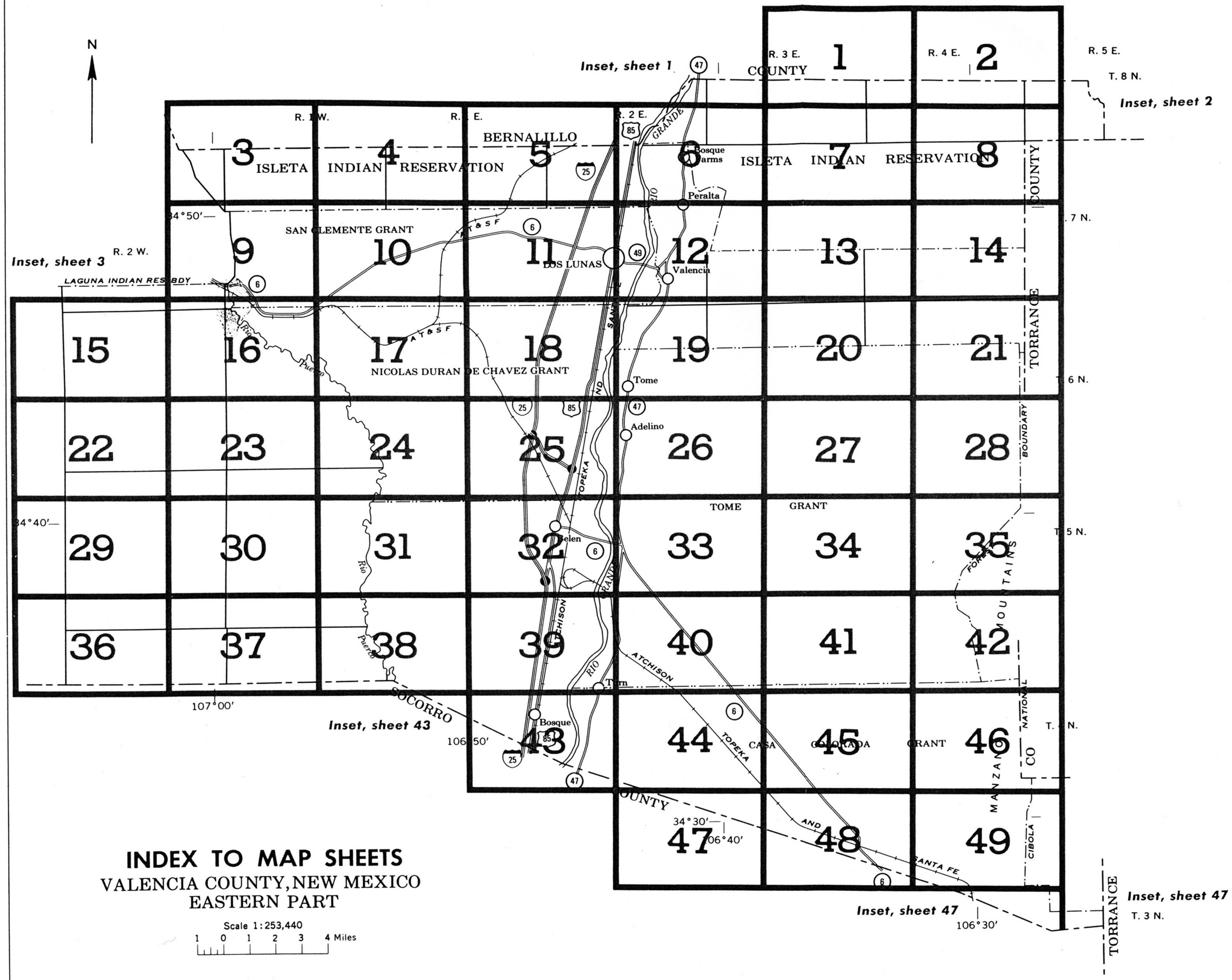
3	Wink-Madurez association: Well-drained, nearly level to moderately sloping soils that are loamy throughout, over layers high in lime; on mesas
4	Tres Hermanos-Madurez-Agustin association: Well-drained, nearly level to moderately sloping soils that are loamy throughout; on piedmont uplands and alluvial fans
5	Tome-Adelino association: Well-drained, level and nearly level soils that are loamy throughout; on alluvial swales and fans
6	Tome-Adelino-Armijo association: Well-drained, level and nearly level saline and alkali soils that are loamy or clayey throughout; on terraces along the Rio Puerco
7	Madurez-Wink association: Well-drained, gently undulating and undulating soils that have a sandy surface layer and loamy subsoil over layers high in lime; on alluvial fans
8	Bluepoint association: Somewhat excessively drained, gently undulating to moderately sloping soils that are sandy throughout; on alluvial fans
9	Bluepoint-Wink-Madurez association: Well-drained to somewhat excessively drained, gently undulating to gently rolling soils that have a sandy surface layer over sandy to loamy layers; on wind-reworked alluvial fans
10	Caliza-Bluepoint association: Well drained to somewhat excessively drained, dominantly moderately sloping to hilly soils that are very gravelly to sandy throughout; on alluvial fans and terraces
11	Nickel-Latene-Ildefonso association: Well-drained, nearly level to hilly soils that are very gravelly to loamy throughout; on alluvial fans
12	Sedillo association: Well-drained, gently sloping to moderately sloping soils that are very gravelly throughout; on alluvial fans

SOILS LESS THAN 5 FEET DEEP TO BEDROCK; ON MOUNTAINS AND FOOTHILLS, BASALT FLOWS, BADLAND, OR ROCK OUTCROPS

13	Salas-Santa Fe association: Dominantly steep and very steep, moderately deep, well-drained very gravelly soils; on mountains and foothills
14	Rock outcrop-Akela-Alemeda association: Nearly level to very steep rock outcrop and very shallow to moderately deep, well-drained very gravelly soils; on basalt lava flows
15	Badland-Rock outcrop and Landslides association: Steep to very steep dissected land types

Compiled 1972

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

VALENCIA COUNTY, NEW MEXICO
EASTERN PART

Scale 1:253,440
1 0 1 2 3 4 Miles

VALENCIA COUNTY, NEW MEXICO, EASTERN PART

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- **Divided** ....
- Good motor ....
- Poor motor ....
- Trail ....

Highway markers
- National Interstate ....
- U. S. ....
- State or county ....

Railroads
- Single track ....
- Multiple track ....
- Abandoned ....

Bridges and crossings
- Road ....
- Trail ....
- Railroad ....
- Ferry .... FY
- Ford .... FORD
- Grade ....
- R. R. over ....
- R. R. under ....

Buildings ....
- School ....
- Church ....

Mine and quarry ....

Gravel pit ....

Power line ....

Pipeline ....

Cemetery ....

Dams ....

Levee ....

Tanks ....

Well, oil or gas ....

Forest fire or lookout station ...

Windmill ....

Benchmark .... BM × 106

BOUNDARIES

National or state ....

County ....

Soil survey ....

Reservation ....

Land grant ....

Small park, cemetery, airport ...

Land survey division corners ...

DRAINAGE

Streams, double-line
- Perennial ....
- Intermittent ....

Streams, single-line
- Perennial ....
- Intermittent
  - Crossable with tillage implements ....
  - Arroyos, unstable side slopes ....
  - Unclassified ....

Canals and ditches ....

Lakes and ponds
- Perennial .... *water* *w*
- Intermittent .... *int*

Spring ....

Marsh or swamp ....

Drainage end or alluvial fan ...

RELIEF

Escarpments
- Bedrock ....
- Other ....

Short steep slope ....

Prominent peak ....

Depressions — Large — Small
- Crossable with tillage implements ....
- Not crossable with tillage implements ....
- Contains water most of the time ....

SOIL SURVEY DATA

Soil boundary and symbol .... Dx

Gravel ....

Stoniness
- Stony ....
- Very stony ....

Rock outcrops ....

Chert fragments ....

Clay spot ....

Sand spot ....

Gumbo or scabby spot ....

Made land ....

Severely eroded spot ....

Blowout, wind erosion ....

Gully ....

Soil sample site ....

Alkali spot ....

Saline spot with seasonal watertable ....

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

VALENCIA COUNTY, NEW MEXICO, EASTERN PART

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

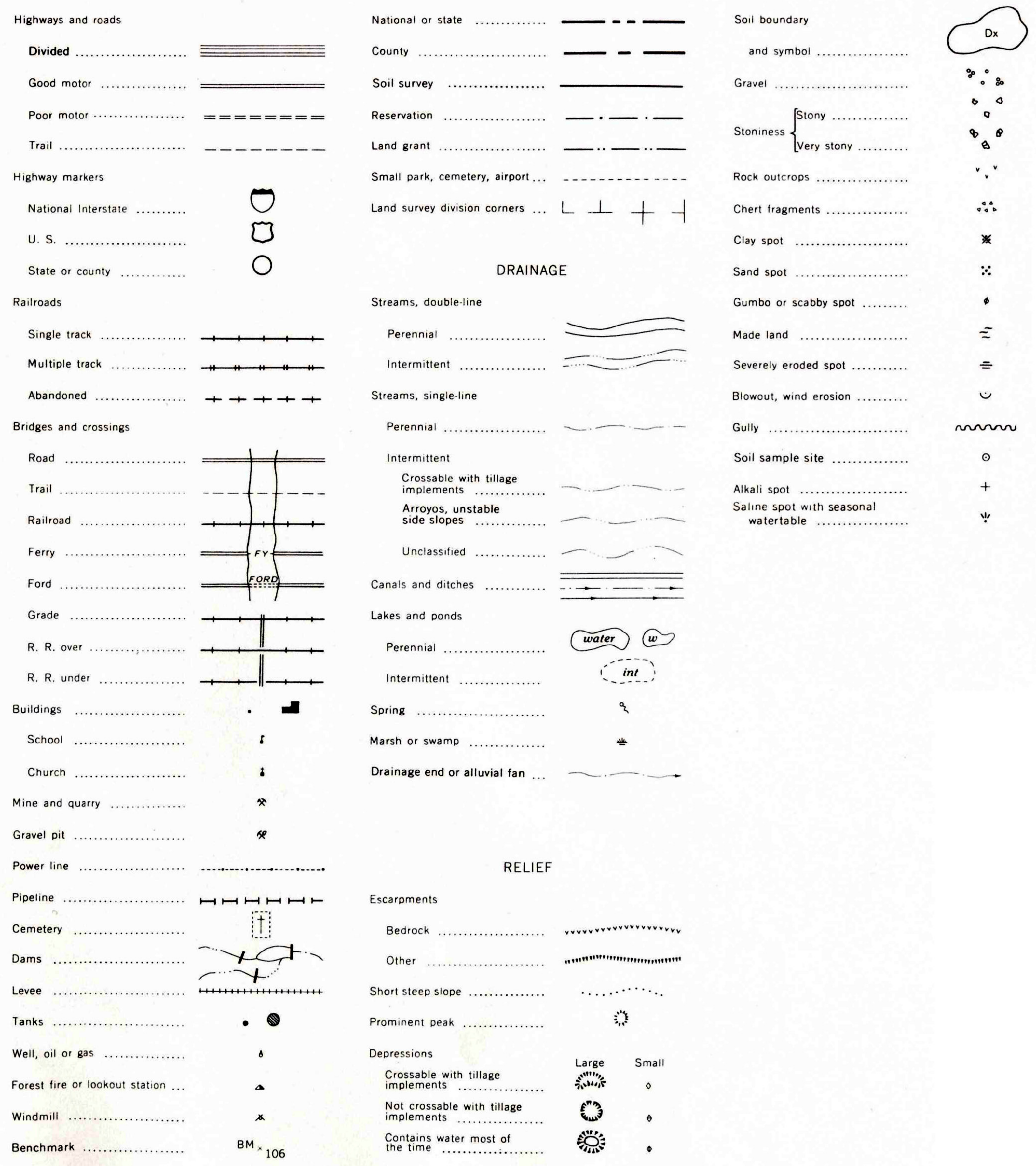
SOIL LEGEND

The first letter, always a capital, is the initial one of the soil name. The second letter is a capital if the mapping unit is one of the low intensity survey; it is a small letter if the mapping unit is one of the high intensity survey.

SYMBOL		NAME
High Intensity	Low Intensity	
Ad	-	Adelino fine sandy loam
-	AE	Adelino-Tome association, gently sloping
Ag	-	Agua loam
Ah	-	Agua loam, slightly saline
Ak	-	Agua loam, moderately alkali
Am	-	Agua clay loam
An	-	Agustin fine sandy loam
-	AO	Agustin-Adelino association, gently sloping
-	AR	Akela-Rock outcrop complex, 1 to 9 percent slopes
-	AS	Alemeda loamy fine sand, 0 to 5 percent slopes
At	-	Anapra clay loam
Au	-	Armijo loam, moderately alkali
-	AV	Armijo sandy clay loam, nonsaline
Aw	-	Armijo clay
Ay	-	Armijo clay, slightly saline
-	BD	Badland
Be	-	Belen loam
Bf	-	Belen clay loam
Bg	-	Belen clay loam, moderately alkali
-	BH	Bluepoint fine sand, rolling
-	BK	Bluepoint loamy sand, hilly
Bm	-	Bluepoint loamy fine sand, 1 to 3 percent slopes
Bn	BO	Bluepoint loamy fine sand, 1 to 9 percent slopes
-	BP	Bluepoint loamy fine sand, hummocky
Br	-	Bluepoint sandy clay loam, 1 to 3 percent slopes
Bs	-	Bluepoint-Wink complex, hummocky
-	BT	Bluepoint-Adelino association, hummocky
Bu	-	Brazito loamy fine sand
Bv	-	Brazito soils, moderately alkali
Bw	-	Brazito sandy clay loam, thick surface
Bx	-	Brazito sandy clay loam, thick surface, moderately saline
Cb	CE	Caliza-Bluepoint complex, 1 to 25 percent slopes
-	DL	Deama-Laporte association, steep
-	DP	Dean-Pinon association, gently sloping
-	FR	Farb-Rock outcrop complex, 5 to 25 percent slopes
Ga	-	Gila loamy fine sand
Gc	-	Gila loamy fine sand, strongly alkali
Gd	-	Gila loam
Ge	-	Gila loam, slightly saline
Gf	-	Gila loam, moderately alkali
Gg	-	Gila loam, strongly alkali
Gh	-	Gila loam, strongly saline and alkali
Gk	-	Gila clay loam
Gm	-	Gila clay loam, slightly saline
Gn	-	Gila clay loam, moderately alkali
Go	-	Glendale loam
Gr	-	Glendale loam, strongly alkali
Gs	-	Glendale clay loam
Gt	-	Glendale soils, slightly saline
-	GV	Gullied land
-	HA	Hassell loam, 2 to 5 percent slopes
-	ID	Ildefonso stony sandy loam, 10 to 20 percent slopes
La	LG	Largo loam
Lr	-	Largo silty clay loam
-	LS	Latene loamy fine sand
-	LV	Latene loam
Ma	-	Madurez loamy sand, hummocky
Md	ME	Madurez loamy fine sand
Mf	-	Madurez fine sandy loam
-	MH	Madurez-Bluepoint association, hummocky
-	MK	Madurez-Wink association, undulating
-	ML	Millett-Tesajo association, sloping
Mn	-	Mixed alluvial land
-	NL	Nickel-Latene association: rolling
Pa	-	Pajarito loamy fine sand
Pf	-	Pajarito loamy fine sand, hummocky
-	PH	Pajarito fine sandy loam
Rv	-	Riverwash
-	RW	Rock land
-	RX	Rock outcrop-Akela complex, 10 to 50 percent slopes
-	RZ	Rock outcrop and Landslides
-	SA	Salas very stony loam, 30 to 70 percent slopes
-	SF	Santa Fe very stony loam, 25 to 70 percent slopes
-	SG	Sedillo very gravelly loam, 3 to 9 percent slopes
-	SL	Sedillo very stony loam, 3 to 9 percent slopes
-	TM	Tome very fine sandy loam
-	TN	Tome-Arizo complex
-	TO	Tome-Adelino association, slightly saline and alkali
-	TR	Tome-Armijo association, strongly saline and alkali
Ts	-	Tres Hermanos fine sandy loam
-	TU	Tres Hermanos-Madurez association, gently sloping
Vd	-	Vinton loamy fine sand
Ve	-	Vinton loamy fine sand, slightly saline
Vf	-	Vinton loamy fine sand, moderately alkali
Vg	-	Vinton loam
Vh	-	Vinton loam, slightly saline
Vk	-	Vinton loam, moderately saline and alkali
Vm	-	Vinton clay loam
Vn	-	Vinton loamy fine sand, loamy subsoil variant
Vo	-	Vinton loam, loamy subsoil variant
Vt	-	Vinton clay loam, loamy subsoil variant
Wk	-	Wink loamy sand
Wm	-	Wink loamy sand, clayey substratum
Wn	-	Wink loamy sand, hummocky
-	WO	Wink fine sandy loam
Wr	-	Wink-Caliza complex, 1 to 15 percent slopes
Ws	-	Wink complex, 1 to 9 percent slopes, eroded
-	WU	Wink-Madurez association, gently sloping

VALENCIA COUNTY, NEW MEXICO, EASTERN PART

CONVENTIONAL SIGNS



WORKS AND STRUCTURES

Highways and roads
- **Divided**
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Benchmark

BOUNDARIES

National or state

County

Soil survey

Reservation

Land grant

Small park, cemetery, airport

Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Arroyos, unstable side slopes
  - Unclassified

Canals and ditches

Lakes and ponds
- Perennial
- Intermittent

Spring

Marsh or swamp

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary
- and symbol

Gravel

Stoniness
- Stony
- Very stony

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

Severely eroded spot

Blowout, wind erosion

Gully

Soil sample site

Alkali spot

Saline spot with seasonal watertable

GUIDE TO MAPPING UNITS

For complete information about a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. The capability classification system is explained, and the use of the soils for crops, range, wildlife, engineering, and town and country planning is discussed in the section "Use and Management of the Soils." Dashes in columns mean that the mapping unit was not placed in that interpretive group. Other information is given in tables, as follows:

Acreage and proportionate extent, table 1, page 9.
Estimated yields, table 2, page 61.
Engineering uses of the soils, tables 4, 5, and 6, pp. 74 through 99.
Town and country planning, table 7, page 102.

HIGH-INTENSITY SURVEY

			Capability unit, irrigated		Dryland capability subclass	Range site		Wildlife habitat group	
Map symbol	Mapping unit	Page	Symbol	Page	Symbol	Name	Page	Symbol	Page
Ad	Adelino fine sandy loam--------	10	------	--	VIIe	Loamy SD	67	I	73
Ag	Agua loam----------------------	11	IIs-1	55	------	-------------------	--	C	72
Ah	Agua loam, slightly saline-----	11	IIIs-4	58	------	-------------------	--	C	72
Ak	Agua loam, moderately alkali---	11	IIIs-5	58	------	-------------------	--	C	72
Am	Agua clay loam-----------------	11	IIs-5	56	------	-------------------	--	C	72
An	Agustin fine sandy loam--------	12	------	--	VIIe	Loamy SD	67	I	73
At	Anapra clay loam---------------	15	IIs-5	56	------	-------------------	--	C	72
Au	Armijo loam, moderately alkali----------------------	16	IVs-5	61	------	-------------------	--	F	73
Aw	Armijo clay--------------------	16	------	--	VIIs	Salty Bottomland SD	68	F	73
Ay	Armijo clay, slightly saline---	16	IIIs-3	57	------	-------------------	--	F	73
Be	Belen loam---------------------	18	IIs-2	55	------	-------------------	--	A	72
Bf	Belen clay loam----------------	18	IIIs-3	57	------	-------------------	--	A	72
Bg	Belen clay loam, moderately alkali----------------------	18	IVs-5	61	------	-------------------	--	A	72
Bm	Bluepoint loamy fine sand, 1 to 3 percent slopes--------	19	IIIe-1	56	VIIe	Deep Sand SD	65	C	72
Bn	Bluepoint loamy fine sand, 1 to 9 percent slopes--------	19	------	--	VIIe	Deep Sand SD	65	D	72
Br	Bluepoint sandy clay loam, 1 to 3 percent slopes--------	20	IIIe-2	57	------	-------------------	--	C	72
Bs	Bluepoint-Wink complex, hummocky--------------------	20	------	--	VIIe	Deep Sand SD	65	--	--
	Bluepoint part------------	--	------	--	------	-------------------	--	D	72
	Wink part-----------------	--	------	--	------	-------------------	--	E	73
Bu	Brazito loamy fine sand--------	20	IVe-1	58	------	-------------------	--	C	72
Bv	Brazito soils, moderately alkali----------------------	21	IVs-1	59	------	-------------------	--	C	72
Bw	Brazito sandy clay loam, thick surface----------------	21	IIIs-2	57	------	-------------------	--	C	72
Bx	Brazito sandy clay loam, thick surface, moderately saline----------------------	21	IVw-1	59	------	-------------------	--	C	72
Cb	Caliza-Bluepoint complex, 1 to 25 percent slopes-------	22	------	--	VIIe	River Breaks SD	68	K	73
Ga	Gila loamy fine sand-----------	27	IIe-1	54	------	-------------------	--	B	72
Gc	Gila loamy fine sand, strongly alkali----------------------	27	IVs-4	60	------	-------------------	--	B	72
Gd	Gila loam----------------------	27	I-1	53	------	-------------------	--	B	72
Ge	Gila loam, slightly saline-----	27	IIs-3	56	------	-------------------	--	B	72
Gf	Gila loam, moderately alkali---	27	IIIs-5	58	------	-------------------	--	B	72
Gg	Gila loam, strongly alkali-----	27	IVs-4	60	------	-------------------	--	B	72
Gh	Gila loam, strongly saline and alkali------------------	27	IVs-3	59	------	-------------------	--	B	72
Gk	Gila clay loam-----------------	26	I-2	53	------	-------------------	--	B	72
Gm	Gila clay loam, slightly saline----------------------	26	IIs-3	56	------	-------------------	--	B	72
Gn	Gila clay loam, moderately alkali----------------------	27	IIIs-5	58	------	-------------------	--	B	72
Go	Glendale loam------------------	29	I-1	53	------	-------------------	--	A	72
Gr	Glendale loam, strongly alkali----------------------	29	IVs-4	60	------	-------------------	--	A	72
Gs	Glendale clay loam-------------	29	I-2	53	------	-------------------	--	A	72
Gt	Glendale soils, slightly saline----------------------	29	IIs-3	56	------	-------------------	--	A	72
La	Largo loam---------------------	32	IIe-3	55	VIIe	Salt Flats SD	68	B	72
Lr	Largo silty clay loam----------	33	I-2	53	VIIc	Salt Flats SD	68	A	72
Ma	Madurez loamy sand, hummocky--------------------	35	------	--	VIIe	Deep Sand SD	65	E	73
Md	Madurez loamy fine sand--------	34	------	--	VIIe	Sandy SD	69	E	73
Mf	Madurez fine sandy loam--------	34	------	--	VIIe	Loamy SD	67	I	73
Mn	Mixed alluvial land------------	36	------	--	VIIw	Salty Bottomland SD	68	N	75
Pa	Pajarito loamy fine sand-------	37	------	--	VIIe	Sandy SD	69	E	73
Pf	Pajarito loamy fine sand, hummocky--------------------	37	------	--	VIIe	Deep Sand SD	65	E	73
Rv	Riverwash----------------------	38	------	--	VIIIw	-------------------	--	--	--
Ts	Tres Hermanos fine sandy loam------------------------	46	------	--	VIIe	Loamy SD	67	I	73
Vd	Vinton loamy fine sand---------	48	IIIe-1	56	------	-------------------	--	C	72
Ve	Vinton loamy fine sand, slightly saline-------------	48	IIIs-4	58	------	-------------------	--	C	72
Vf	Vinton loamy fine sand, moderately alkali-----------	48	IIIs-5	58	------	-------------------	--	C	72
Vg	Vinton loam--------------------	47	IIs-1	55	------	-------------------	--	C	72
Vh	Vinton loam, slightly saline---	48	IIIs-4	58	------	-------------------	--	C	72
Vk	Vinton loam, moderately saline and alkali-----------	47	IVs-3	59	------	-------------------	--	C	72
Vm	Vinton clay loam---------------	47	IIs-5	56	------	-------------------	--	C	72
Vn	Vinton loamy fine sand, loamy subsoil variant-------------	48	IIe-1	54	------	-------------------	--	B	72
Vo	Vinton loam, loamy subsoil variant---------------------	49	IIs-1	55	------	-------------------	--	B	72
Vt	Vinton clay loam, loamy subsoil variant-------------	49	IIs-5	56	------	-------------------	--	B	72
Wk	Wink loamy sand----------------	50	------	--	VIIe	Sandy SD	69	E	73
Wm	Wink loamy sand, clayey substratum------------------	50	------	--	VIIe	Sandy SD	69	E	73
Wn	Wink loamy sand, hummocky------	50	------	--	VIIe	Deep Sand SD	65	E	73
Wr	Wink-Caliza complex, 1 to 15 percent slopes--------------	50	------	--	VIIe	-------------------	--	--	--
	Wink part-----------------	--	------	--	------	Sandy SD	69	E	73
	Caliza part---------------	--	------	--	------	River Breaks SD	68	K	73
Ws	Wink complex, 1 to 9 percent slopes, eroded--------------	51	------	--	VIIe	Salt Flats SD	68	I	73

525-612 O - 75 (Face Maps) No. 2

GUIDE TO MAPPING UNITS--Continued

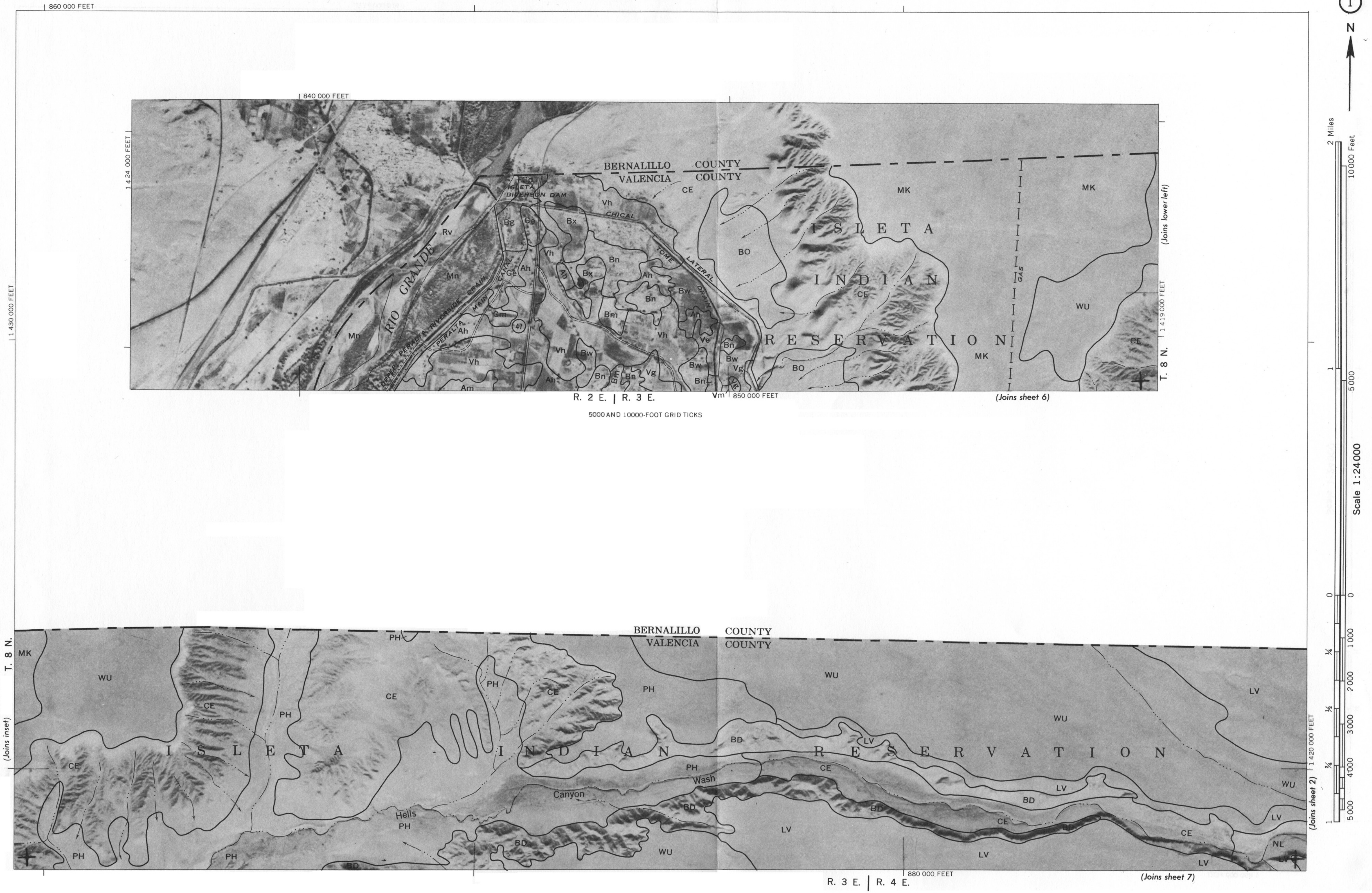
LOW-INTENSITY SURVEY

Map symbol	Mapping unit	Page	Capability unit, irrigated		Dryland capability subclass	Range site		Wildlife habitat group	
			Symbol	Page	Symbol	Name	Page	Symbol	Page
AE	Adelino-Tome association, gently sloping	10	------	--	VIIe	Loamy SD	67	I	73
AO	Agustin-Adelino association, gently sloping	12	------	--	VIIe	Loamy SD	67	I	73
AR	Akela-Rock outcrop complex, 1 to 9 percent slopes	13	------	--	VIIs	Malpais SD	67	K	73
AS	Alemeda loamy fine sand, 0 to 5 percent slopes	14	------	--	VIIe	Sandy SD	69	E	73
AV	Armijo sandy clay loam, nonsaline	16	------	--	VIIs	Loamy SD	67	I	73
BD	Badland	16	------	--	VIIIe	-------------------	--	O	75
BH	Bluepoint fine sand, rolling	19	------	--	VIIe	Sand Hills SD	68	D	72
BK	Bluepoint loamy sand, hilly	19	------	--	VIIe	River Breaks SD	68	K	73
BO	Bluepoint loamy fine sand, 1 to 9 percent slopes	19	------	--	VIIe	Deep Sand SD	65	D	72
BP	Bluepoint loamy fine sand, hummocky	19	------	--	VIIe	Deep Sand SD	65	D	72
BT	Bluepoint-Adelino association, hummocky	20	------	--	VIIe	-------------------	--	--	--
	Bluepoint part	--	------	--	------	Deep Sand SD	65	D	72
	Adelino part	--	------	--	------	Sandy SD	69	E	73
CE	Caliza-Bluepoint complex, 1 to 25 percent slopes	23	------	--	VIIe	River Breaks SD	68	K	73
DL	Deama-Laporte association, steep	23	------	--	VIIs	Breaks CP	64	G	73
DP	Dean-Pinon association, gently sloping	24	------	--	------	-------------------	--	--	--
	Dean part	--	------	--	VIe	Loamy CP	67	H	73
	Pinon part	--	------	--	VIIs	Shallow CP	69	L	74
FR	Farb-Rock outcrop complex, 5 to 25 percent slopes	25	------	--	VIIs	Shallow Sandstone WP	70	L	74
GV	Gullied land	29	------	--	VIIIe	-------------------	--	--	--
HA	Hassell loam, 2 to 5 percent slopes	31	------	--	VIe	Loamy CP	67	H	73
ID	Ildefonso stony sandy loam, 10 to 20 percent slopes	31	------	--	VIIs	Gravelly WP	65	L	74
LG	Largo loam	33	------	--	VIIe	Salt Flats SD	68	H	73
LS	Latene loamy fine sand	33	------	--	VIIe	Sandy SD	69	E	73
LV	Latene loam	33	------	--	VIIe	Loamy SD	67	I	73
ME	Madurez loamy fine sand	34	------	--	VIIe	Sandy SD	69	E	73
MH	Madurez-Bluepoint association, hummocky	35	------	--	VIIe	Deep Sand SD	65	--	--
	Madurez part	--	------	--	------	-------------------	--	E	73
	Bluepoint part	--	------	--	------	-------------------	--	D	72
MK	Madurez-Wink association, undulating	35	------	--	VIIe	Sandy SD	69	E	73
ML	Millett-Tesajo association, sloping	36	------	--	VIs	Gravelly WP	65	J	73
NL	Nickel-Latene association, rolling	36	------	--	VIIe	-------------------	--	--	--
	Nickel part	--	------	--	------	Limy SD	67	K	73
	Latene part	--	------	--	------	Loamy SD	67	I	73
PH	Pajarito fine sandy loam	37	------	--	VIIe	Loamy SD	67	I	73
RW	Rock land	38	------	--	VIIs	Breaks CP	64	M	74
RX	Rock outcrop-Akela complex, 10 to 50 percent slopes	38	------	--	VIIIs	-------------------	--	M	74
	Rock outcrop part	--	------	--	------	-------------------	--	--	--
	Akela part	--	------	--	------	Breaks SD	64	--	--
RZ	Rock outcrop and Landslides	39	------	--	VIIIs	-------------------	--	O	75
SA	Salas very stony loam, 30 to 70 percent slopes	40	------	--	VIIs	Gravelly WP	65	G	73
SF	Santa Fe very stony loam, 25 to 70 percent slopes	41	------	--	VIIs	Hills CP	66	G	73
SG	Sedillo very gravelly loam, 3 to 9 percent slopes	43	------	--	VIs	Gravelly WP	65	L	74
SL	Sedillo very stony loam, 3 to 9 percent slopes	43	------	--	VIIs	Gravelly WP	65	L	74
TM	Tome very fine sandy loam	45	------	--	VIIe	Loamy SD	67	I	73
TN	Tome-Arizo complex	45	------	--	VIIe	-------------------	--	--	--
	Tome part	--	------	--	------	Loamy SD	67	I	73
	Arizo part	--	------	--	------	Sandy SD	69	K	73
TO	Tome-Adelino association slightly saline and alkali	45	------	--	VIIs	Salt Flats SD	68	I	73
TR	Tome-Armijo association, strongly saline and alkali	46	------	--	VIIs	Salt Flats SD	68	I	73
TU	Tres Hermanos-Madurez association, gently sloping	46	------	--	VIIe	Loamy SD	67	I	73
WO	Wink fine sandy loam	49	------	--	VIIe	Loamy SD	67	I	73
WU	Wink-Madurez association, gently sloping	50	------	--	VIIe	Loamy SD	67	I	73

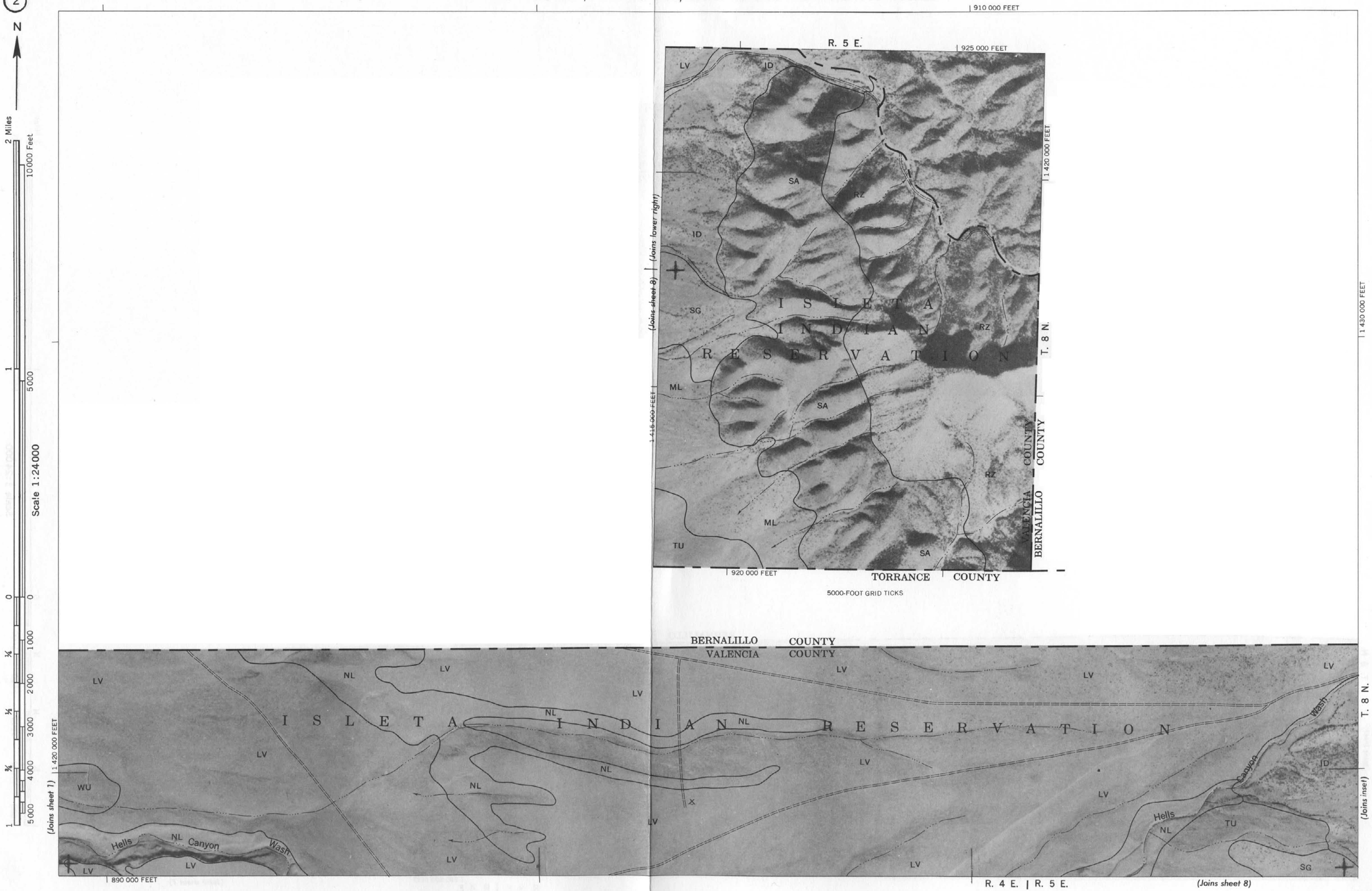
525-612 O - 75 (Face Maps) No. 1

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 1

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 2



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 3

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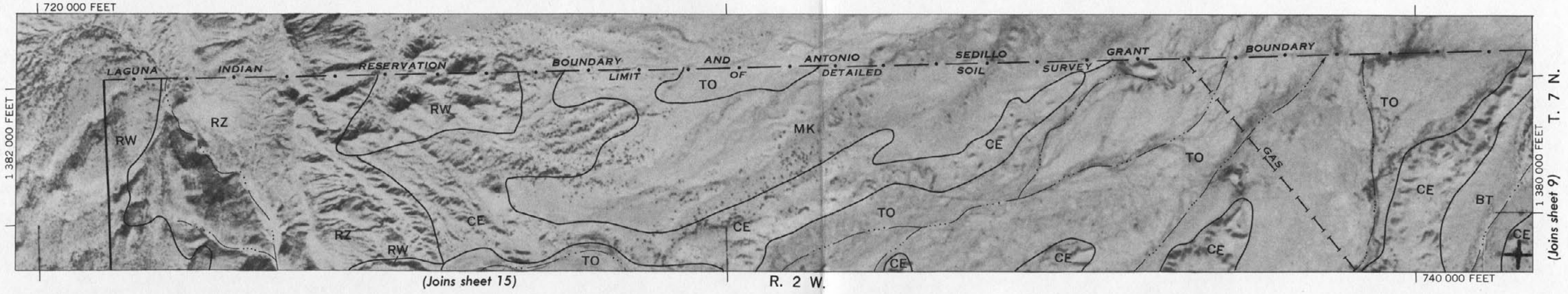
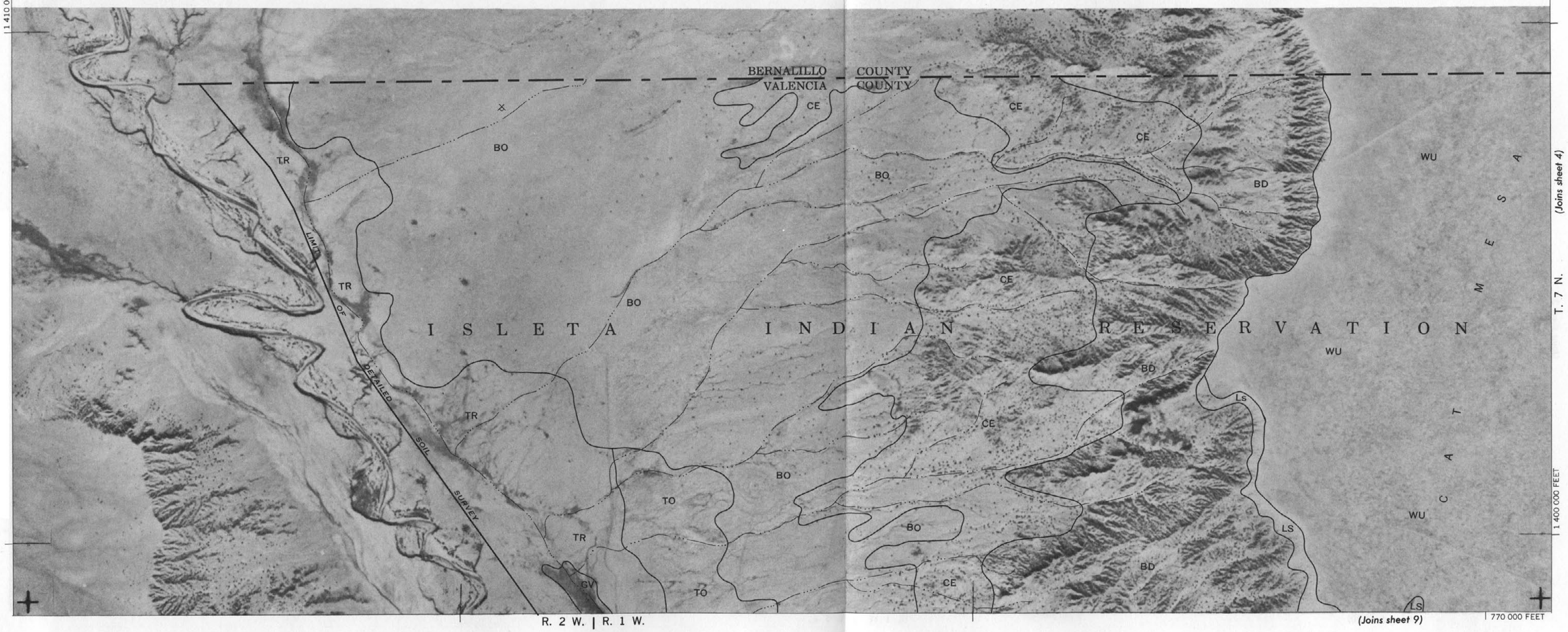
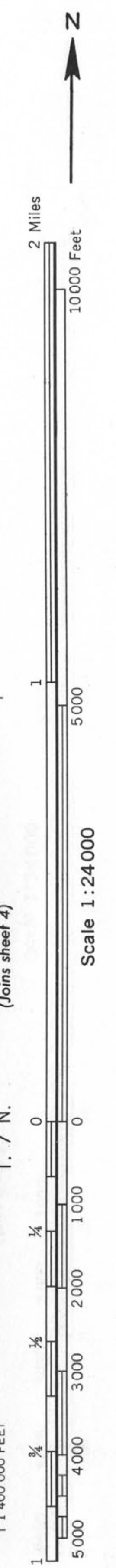
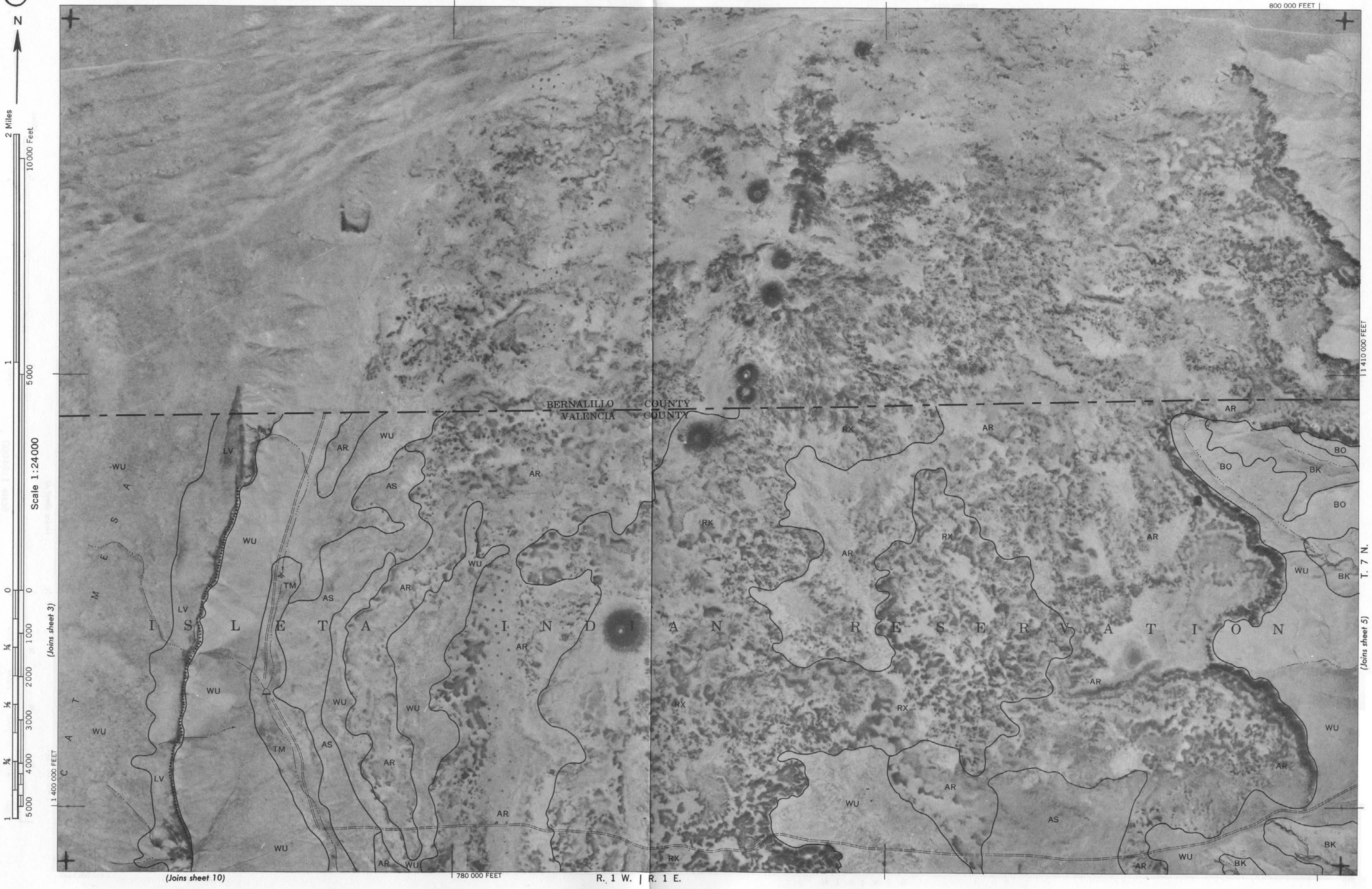


2000 AND 10000-FOOT GRID TICKS





VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 4



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 5

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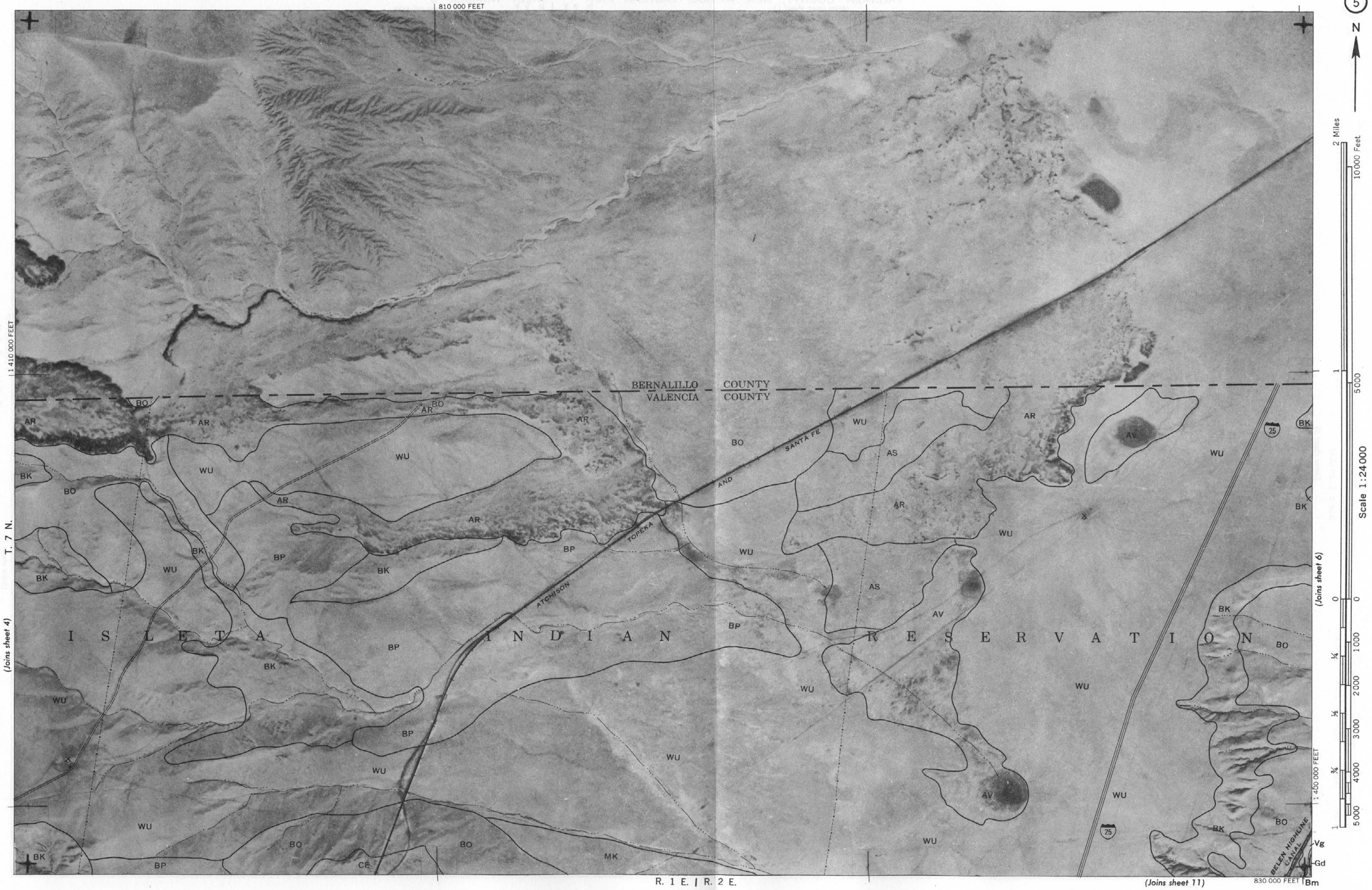
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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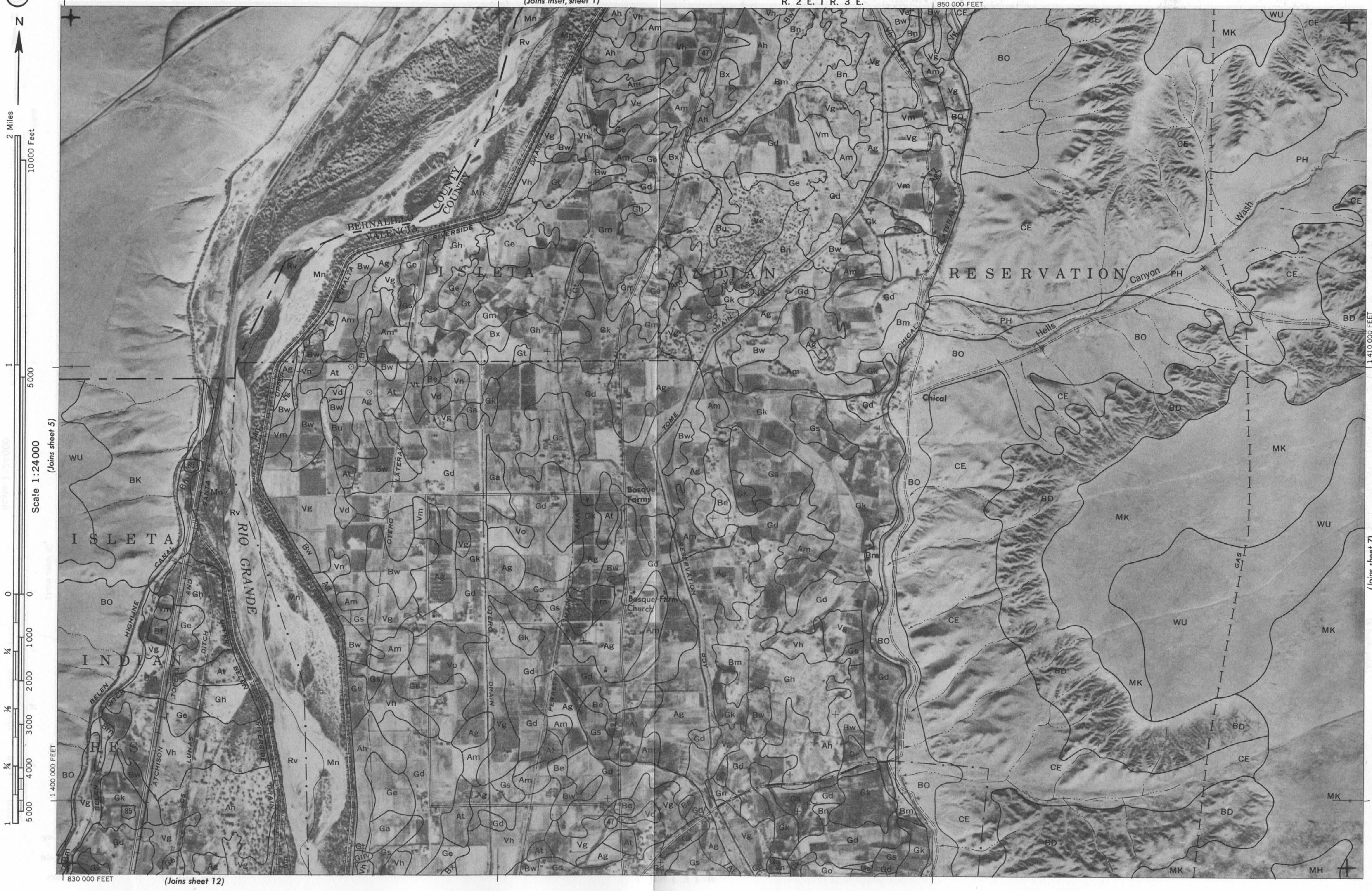
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 6



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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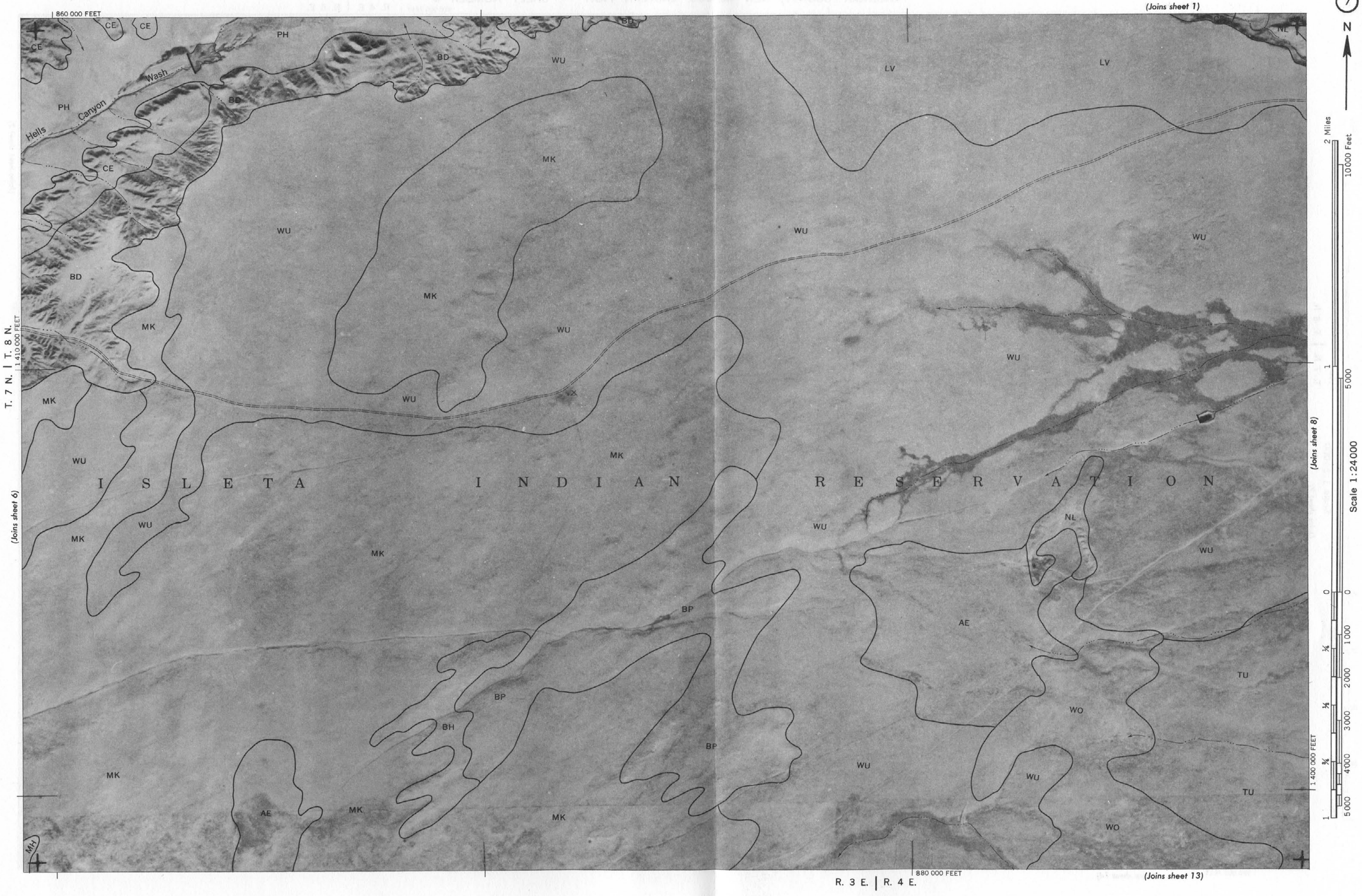
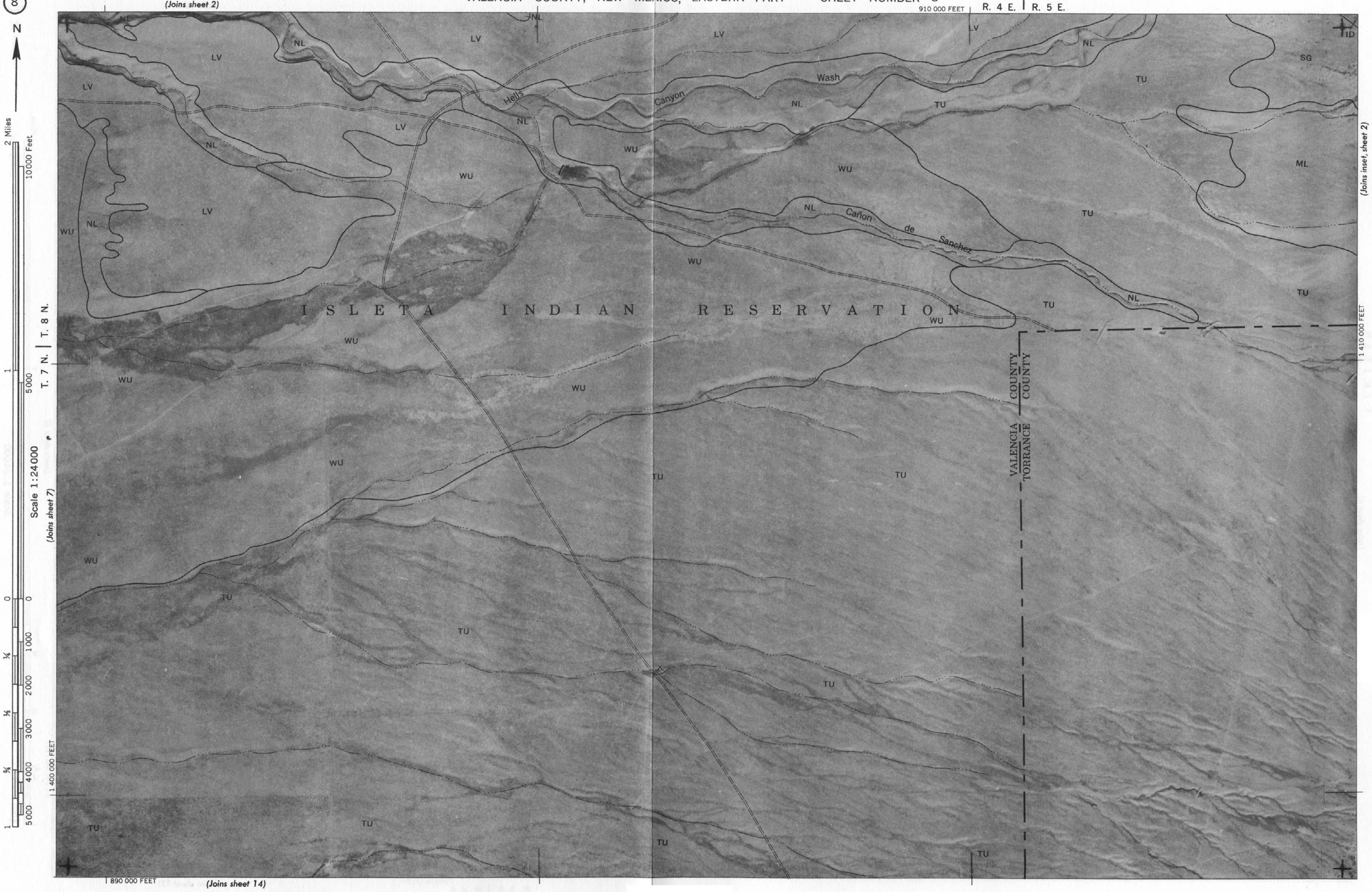
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 7

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 8



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 9

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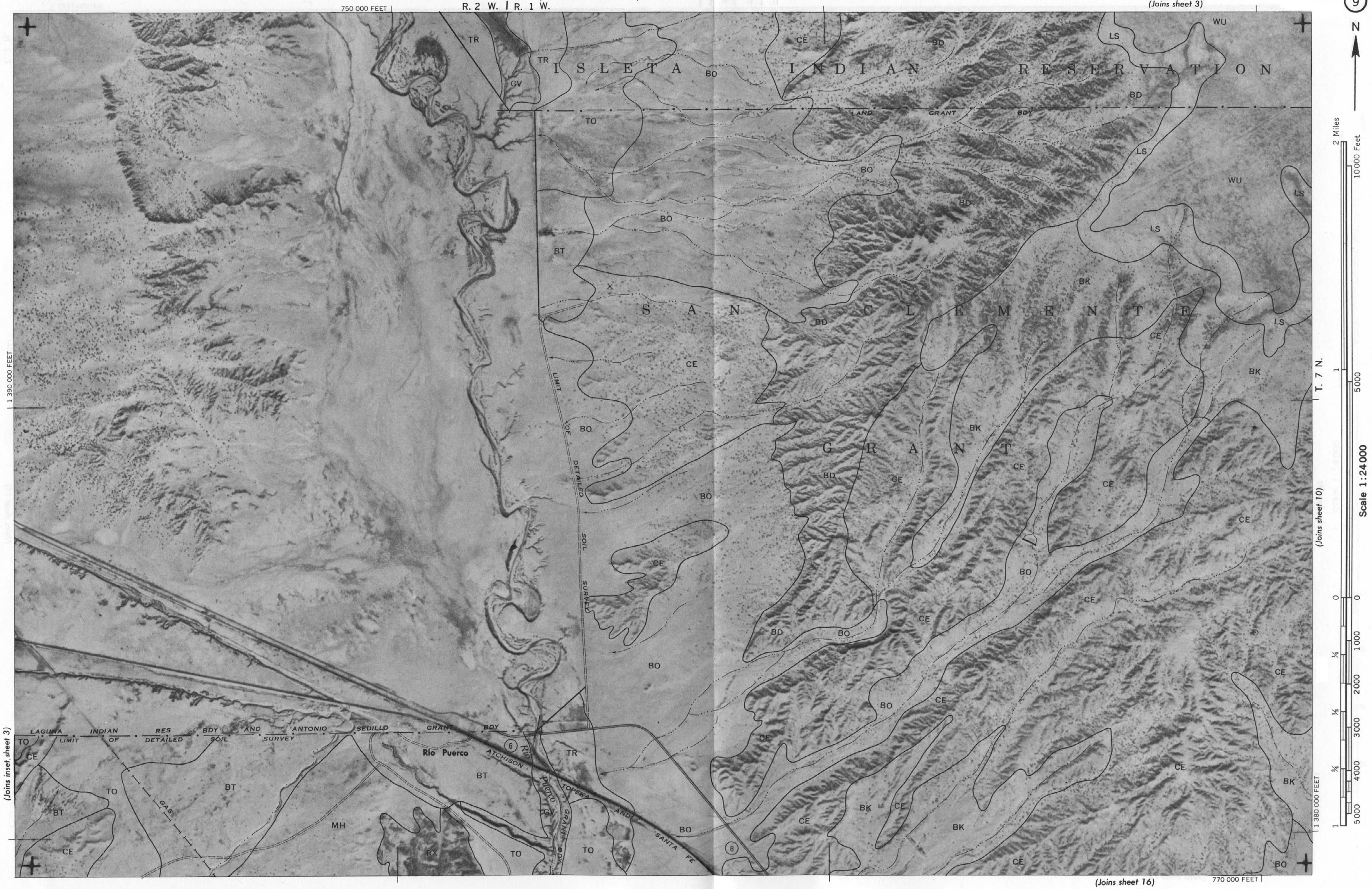
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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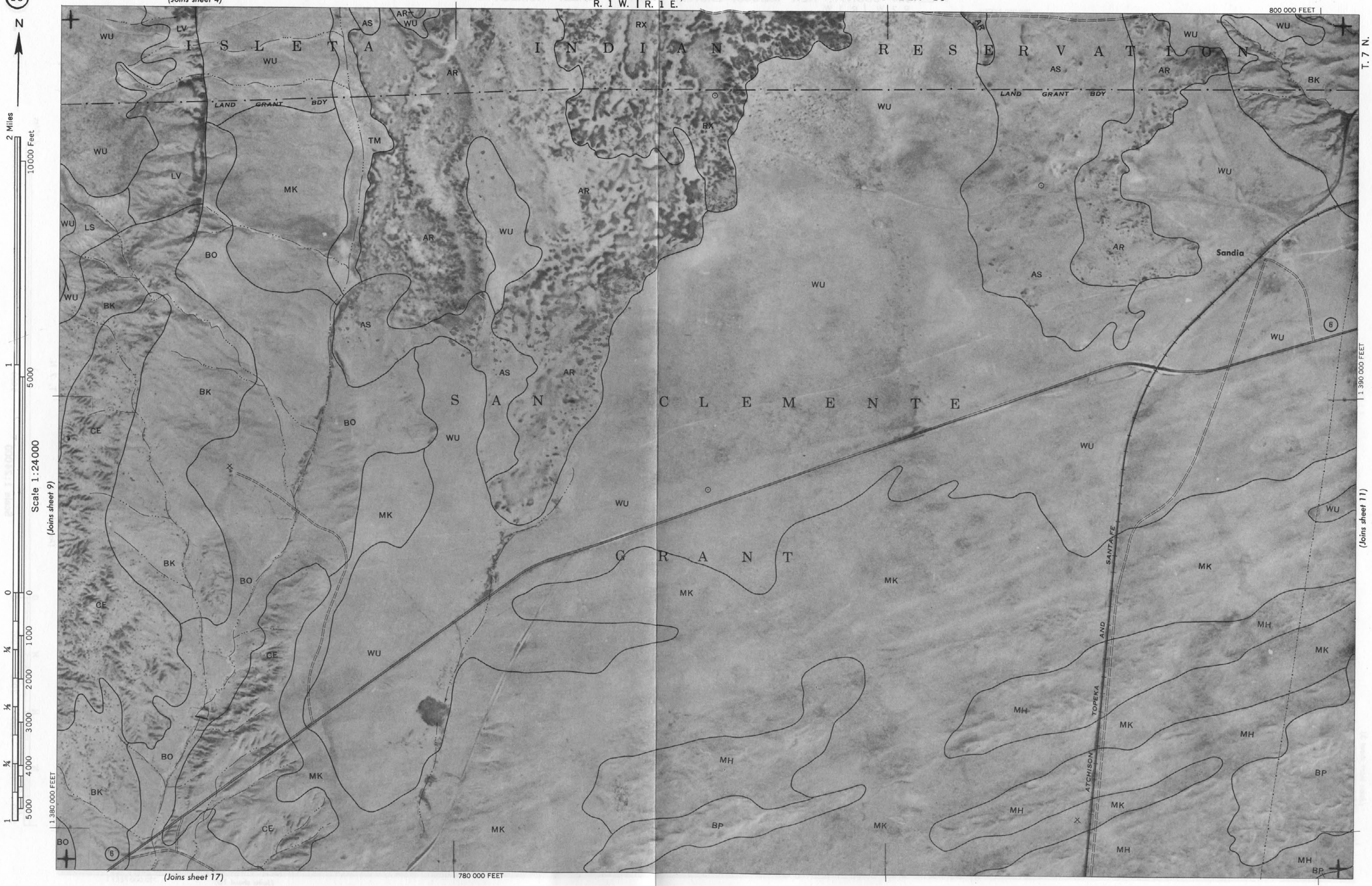
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 10



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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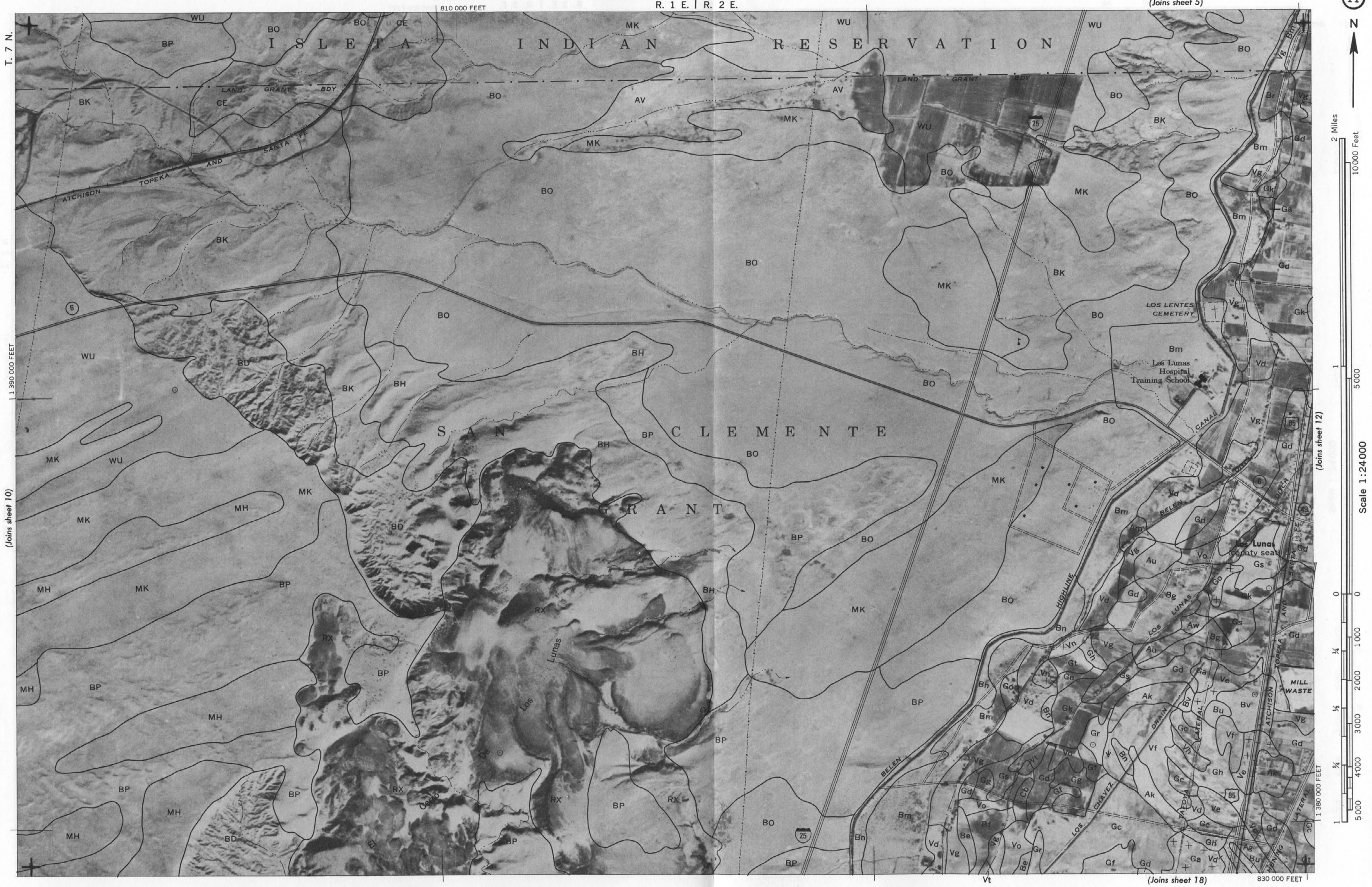
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 11



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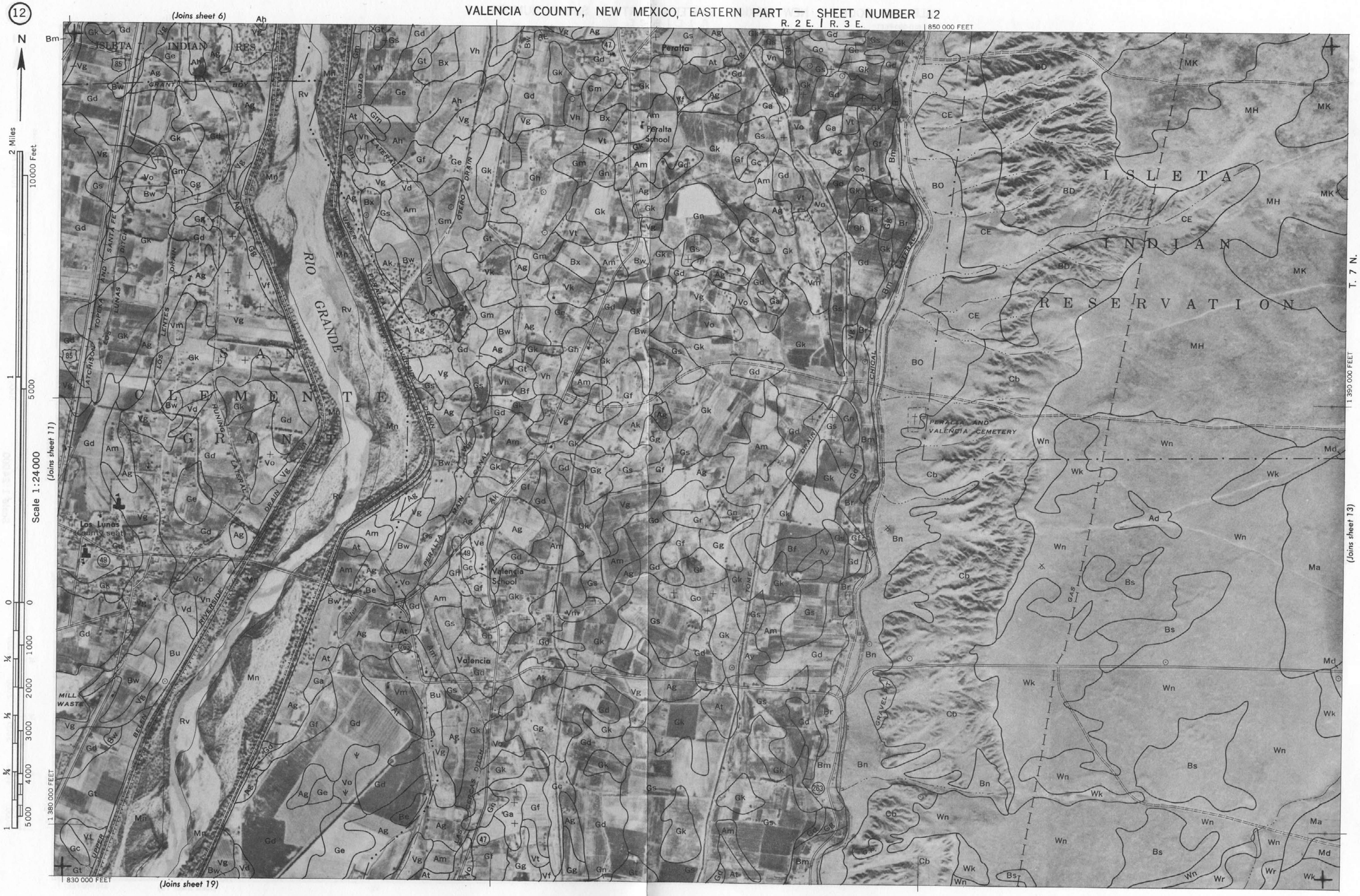
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 12



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 13

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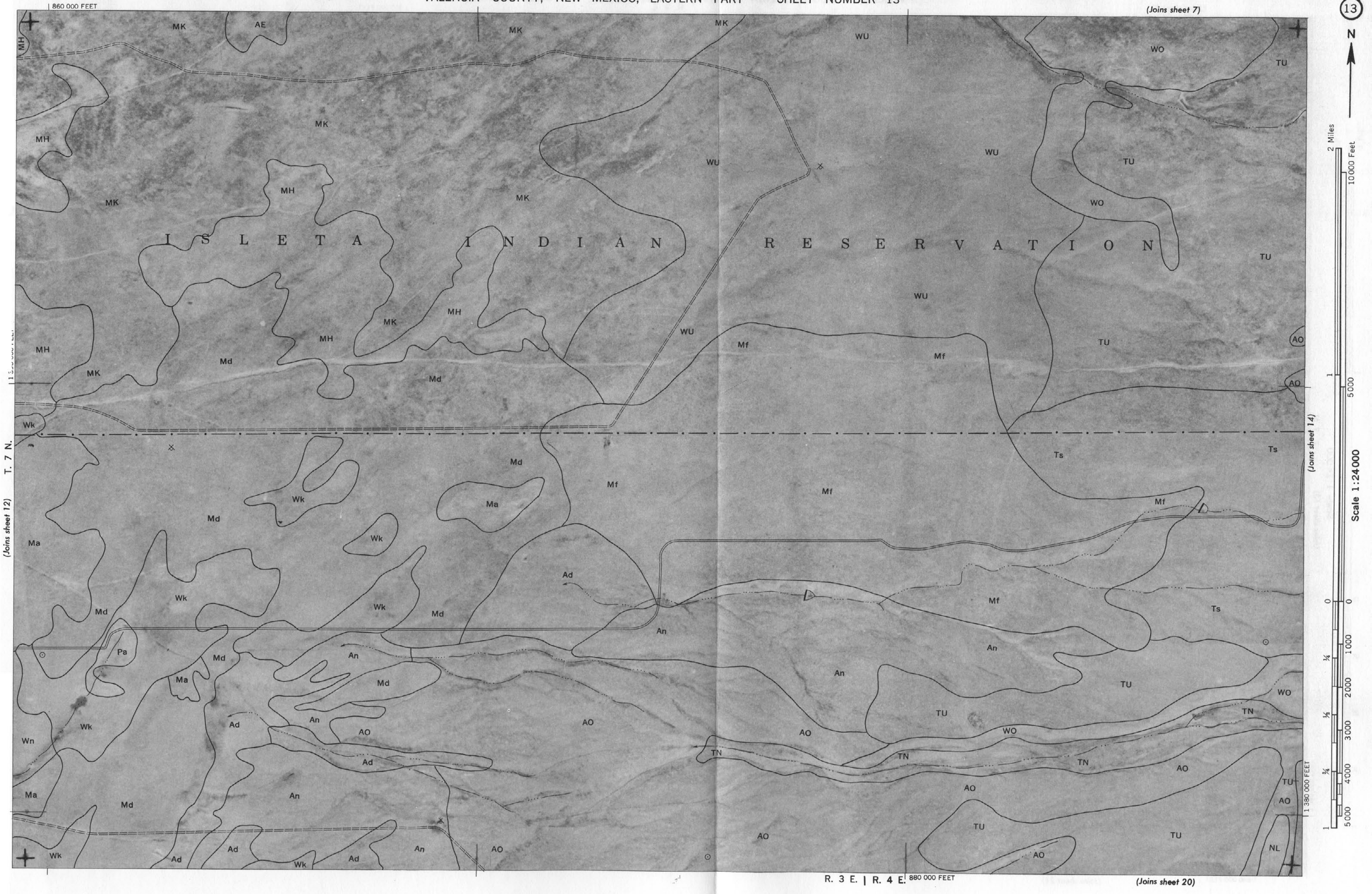
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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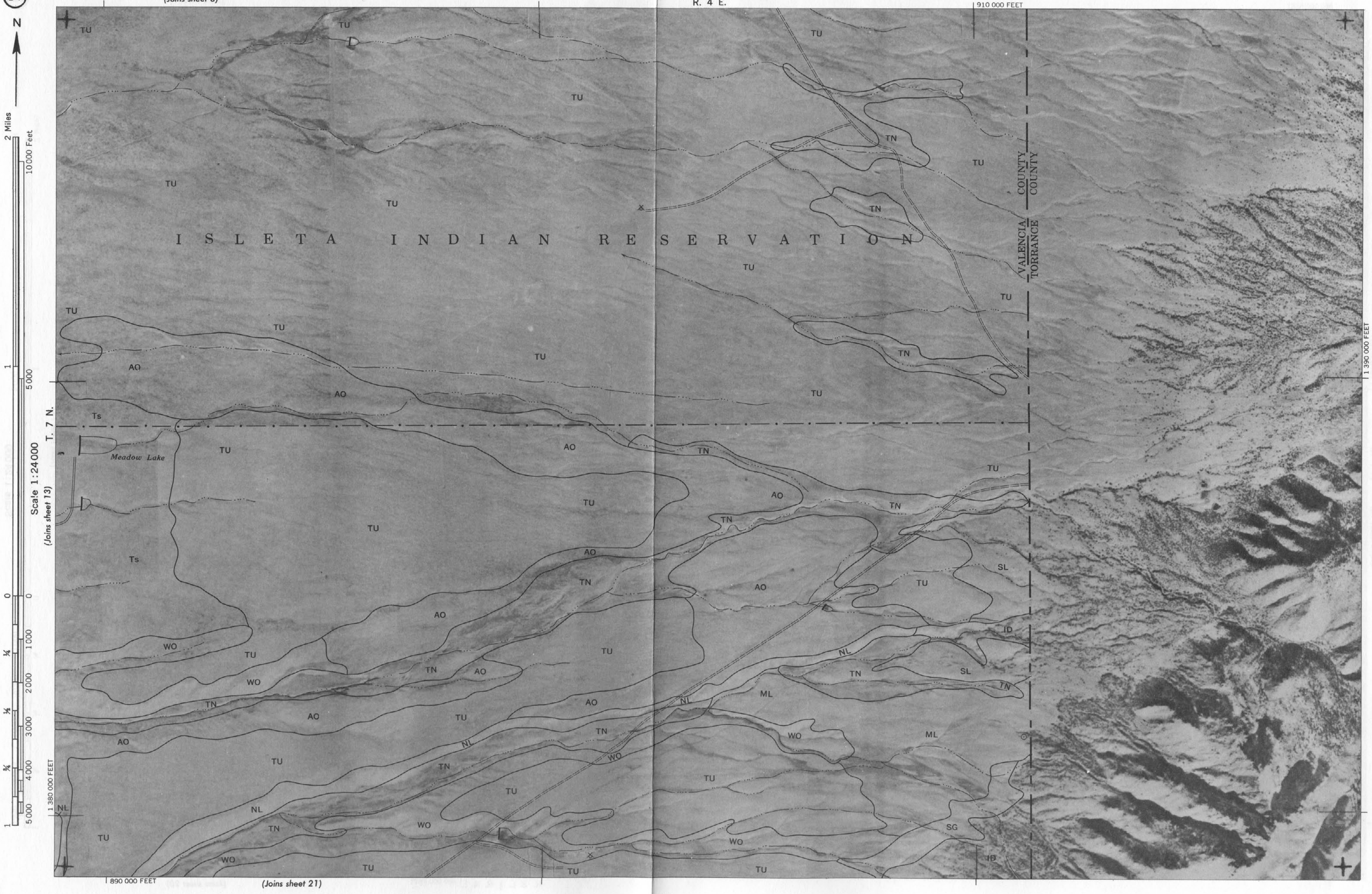
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 14



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.
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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 15

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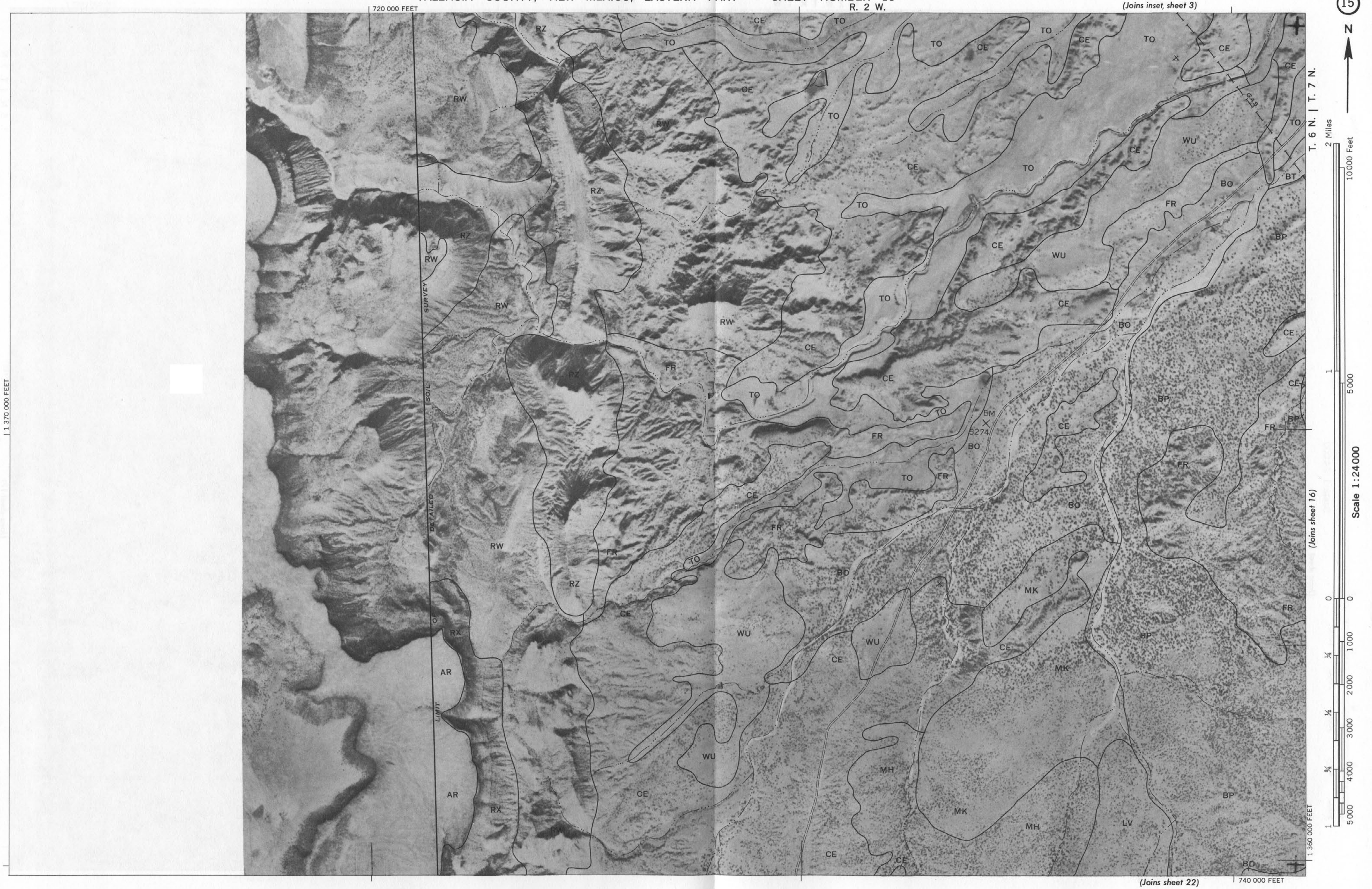
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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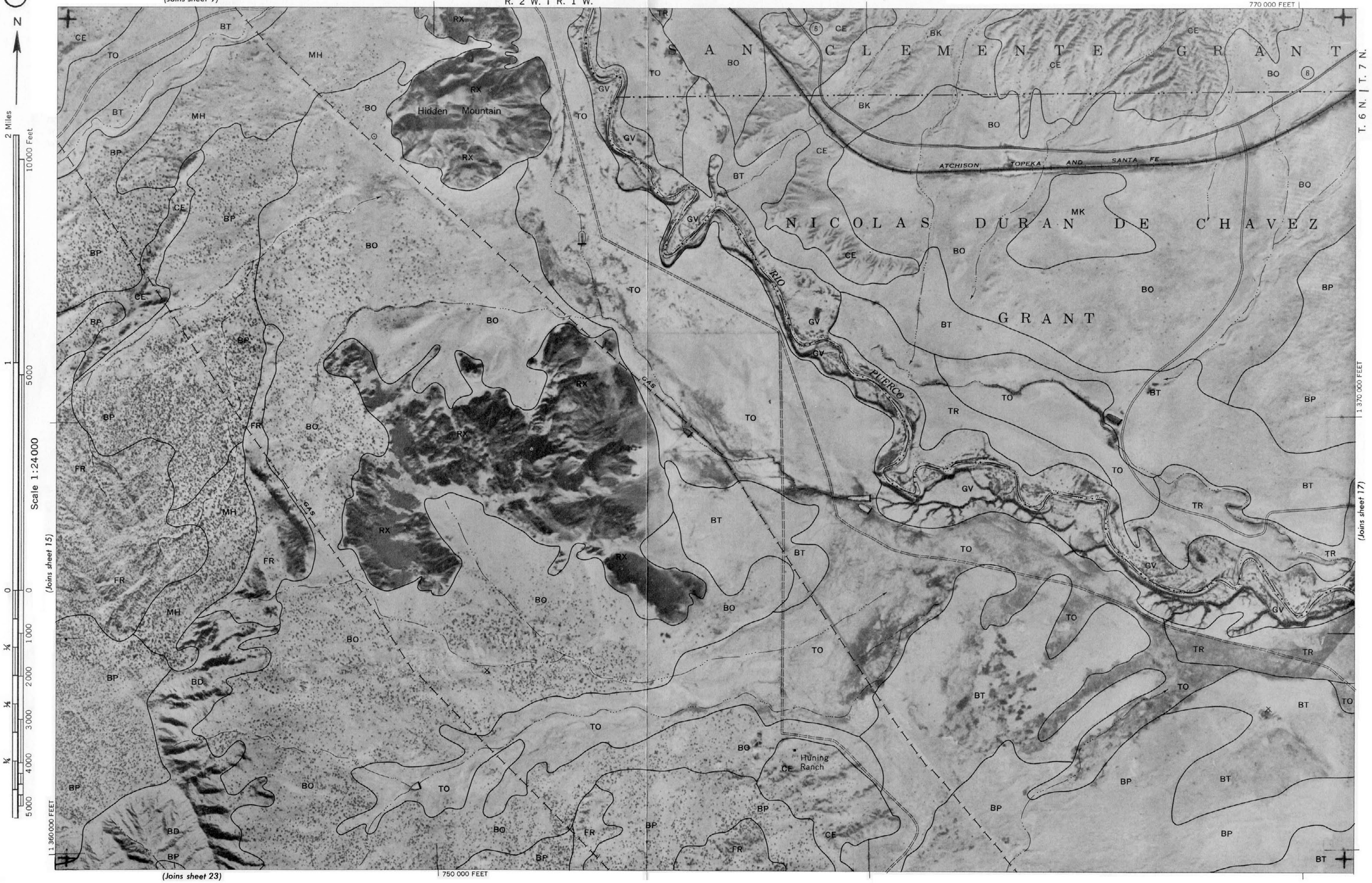
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 16



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 17

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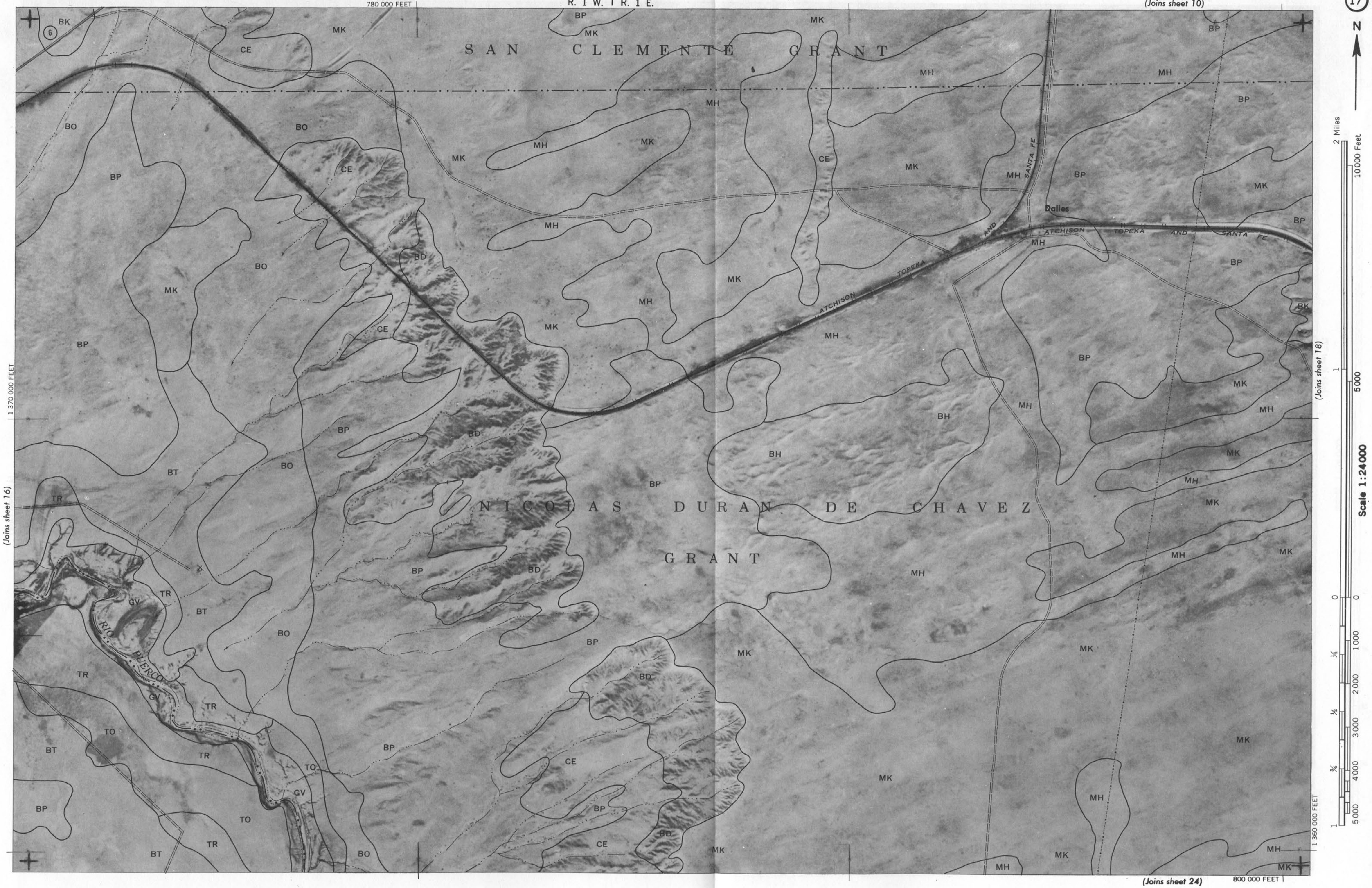
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 18

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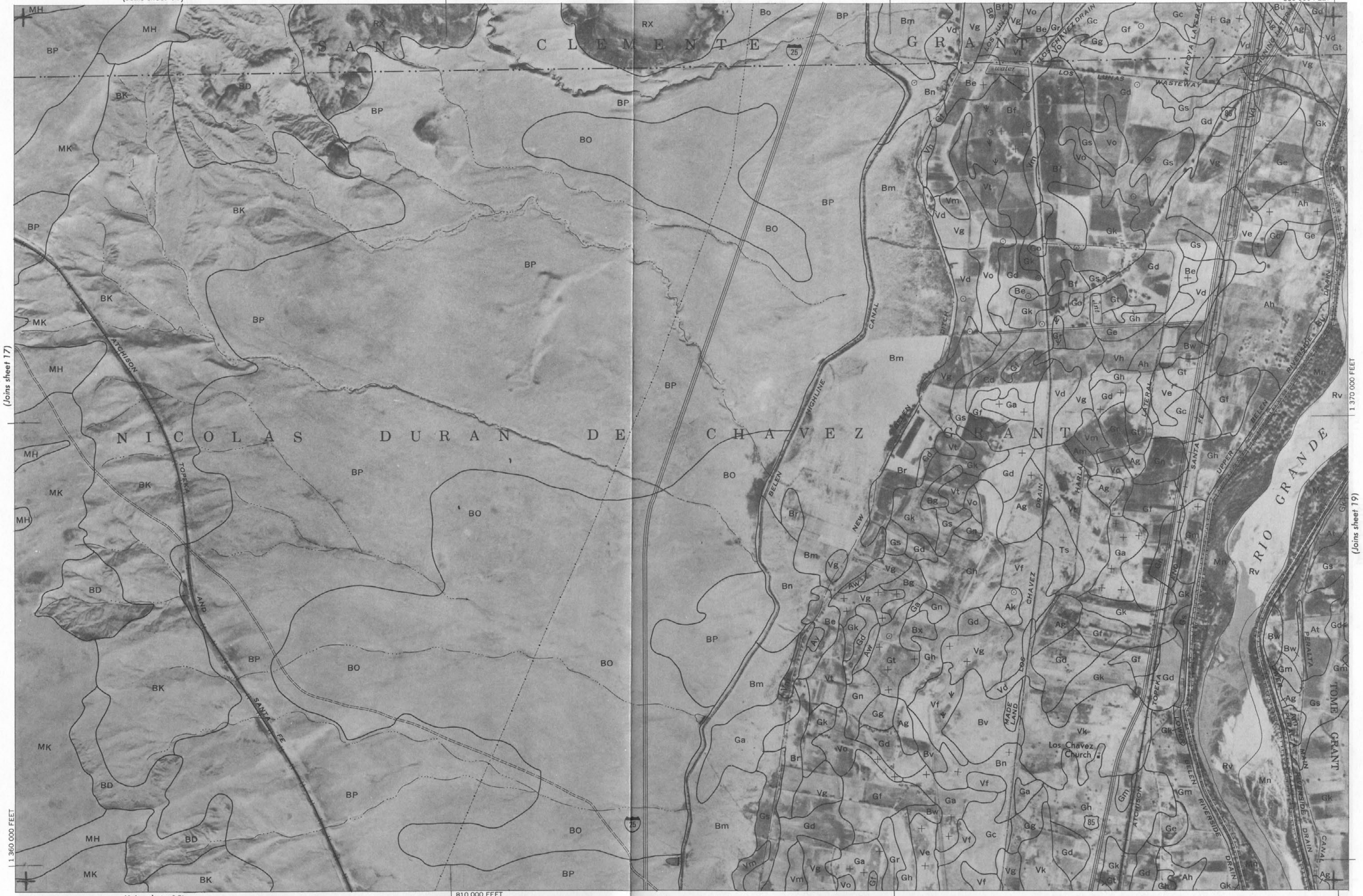

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 25)

830 000 FEET

810 000 FEET

1 360 000 FEET

1 370 000 FEET

2 Miles

10000 Feet

1

5000

Scale 1:24000

0 0

1000

¼ 2000

½ 3000

¾ 4000

5000

1

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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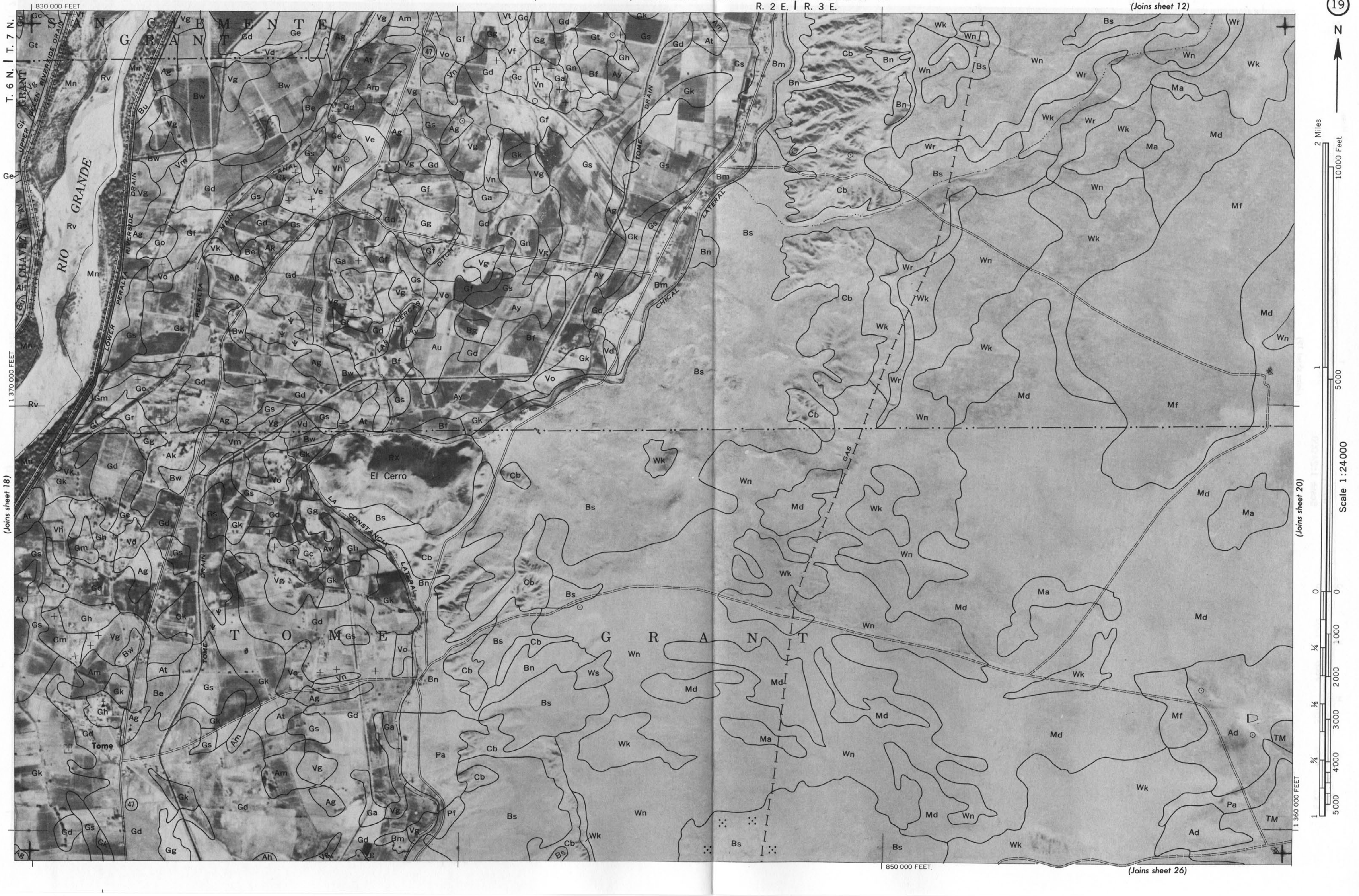
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 19



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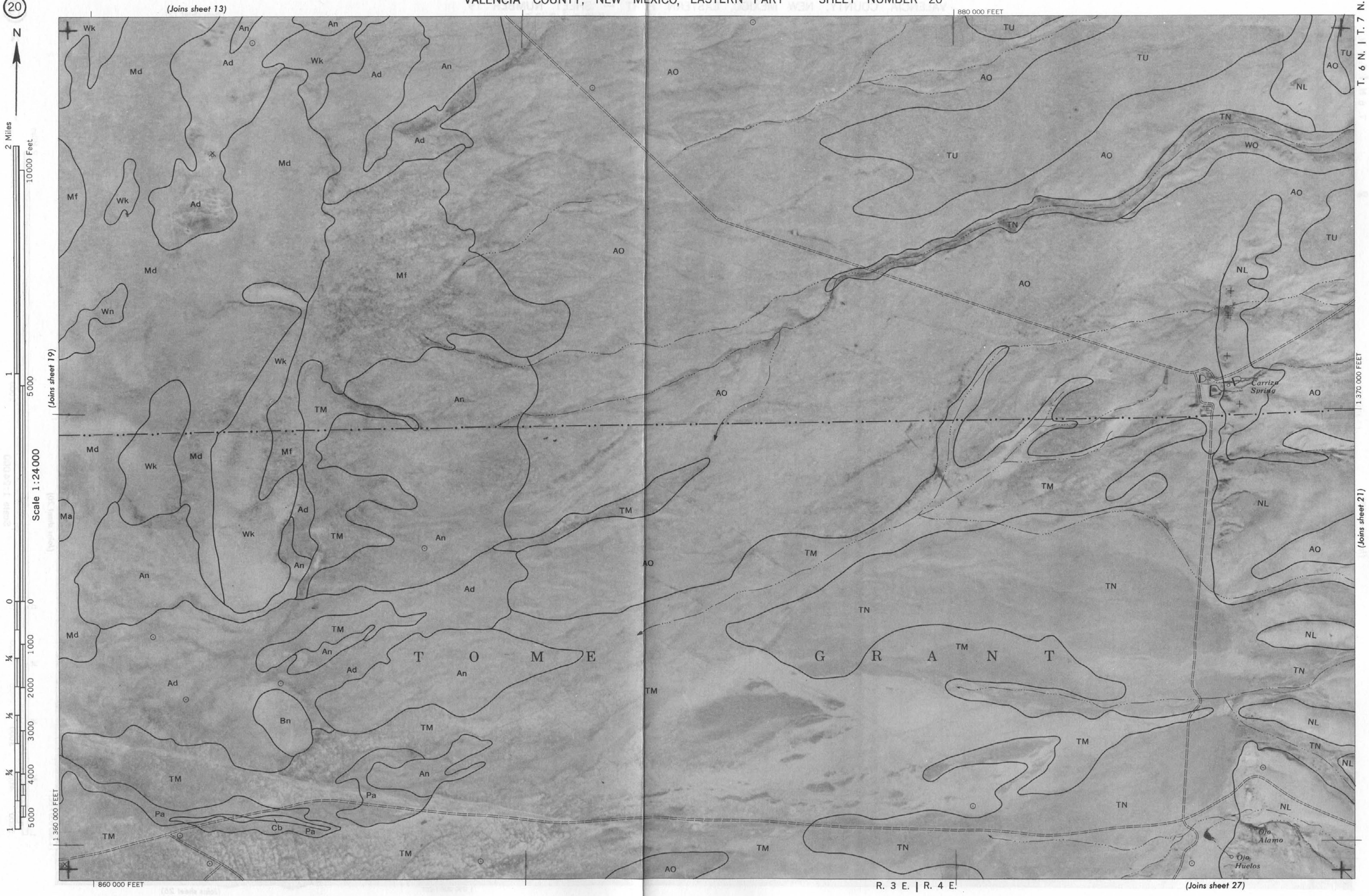
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

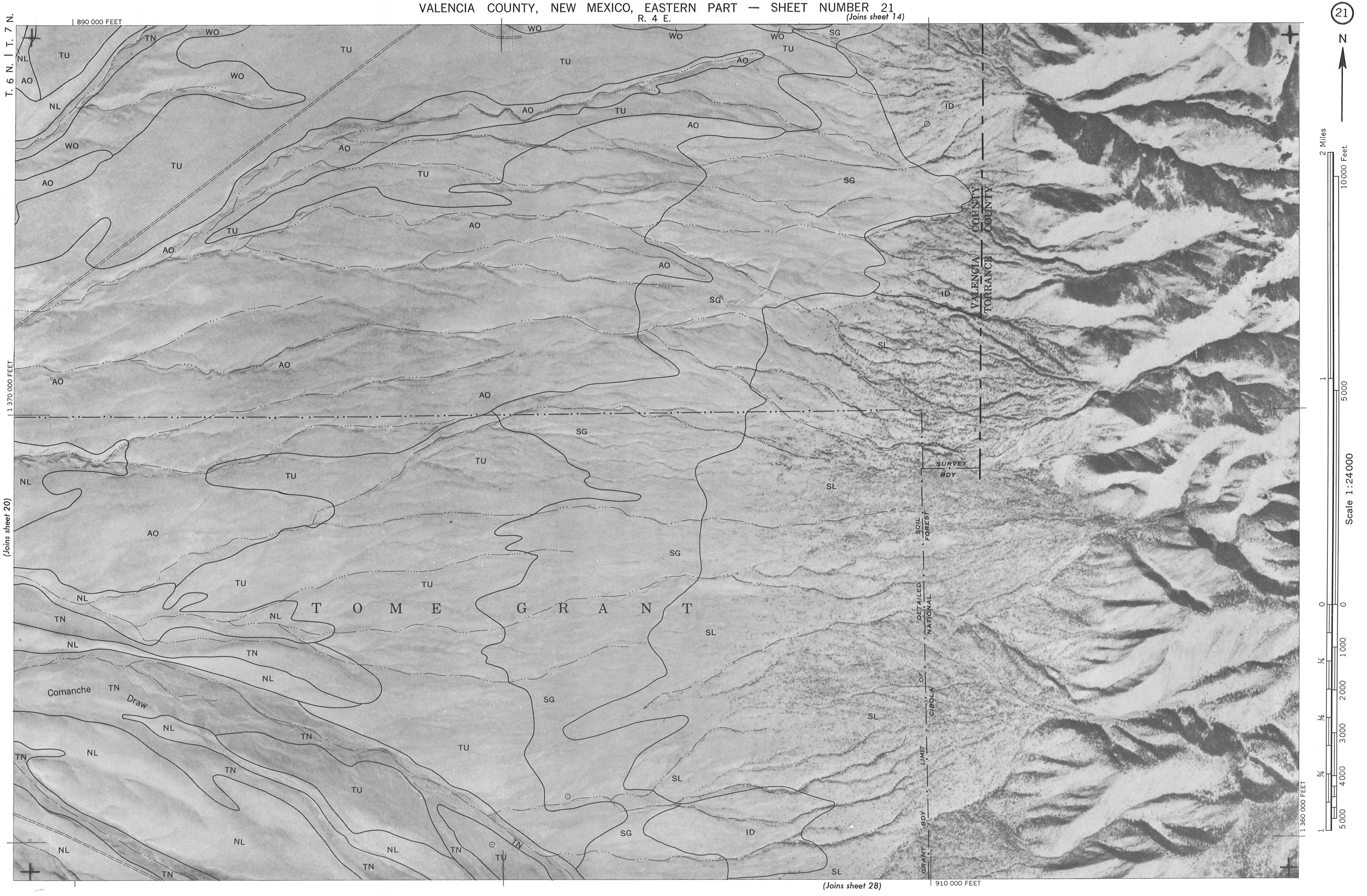
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 20



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior,

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 21



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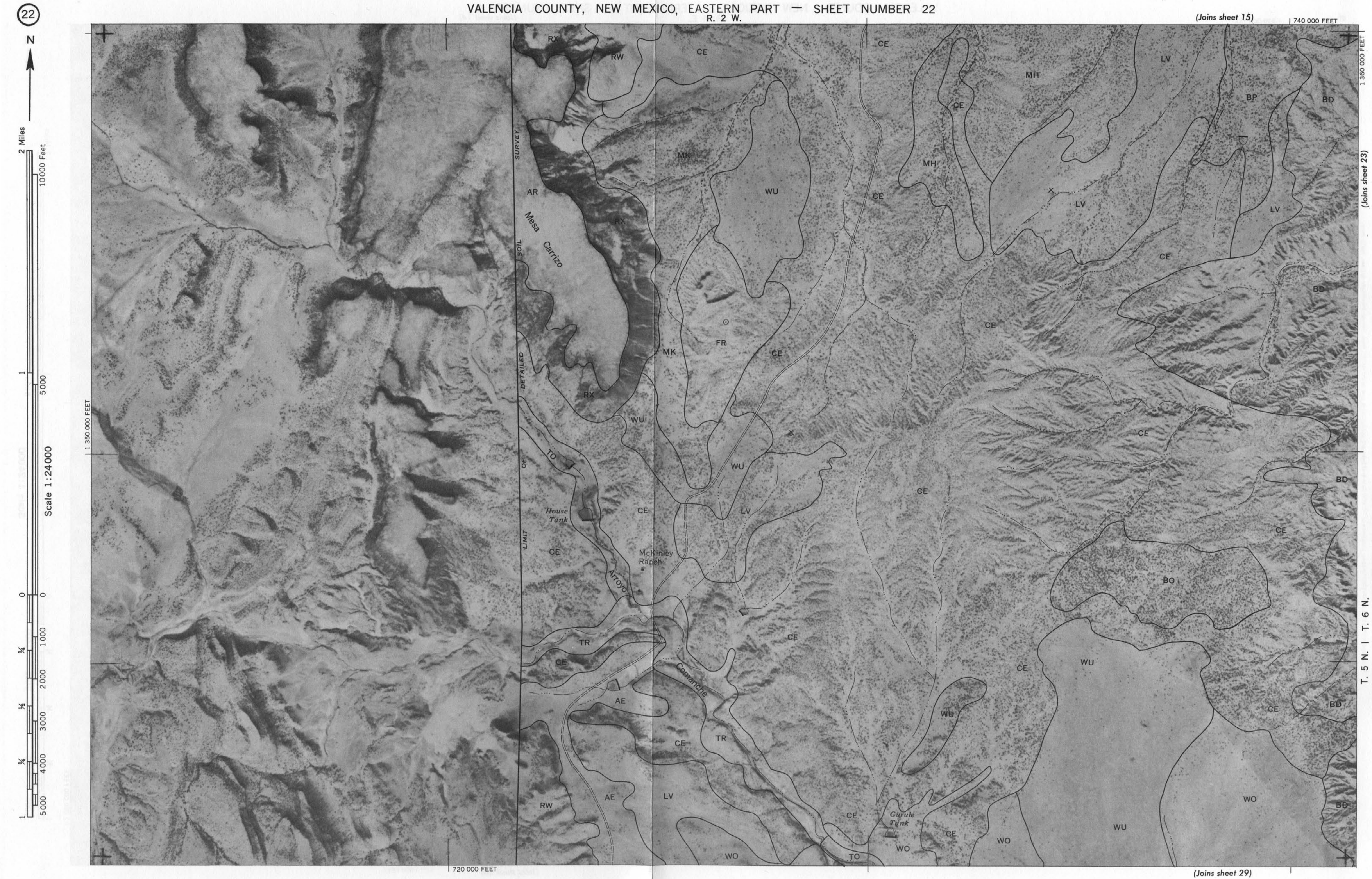
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 22



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 23

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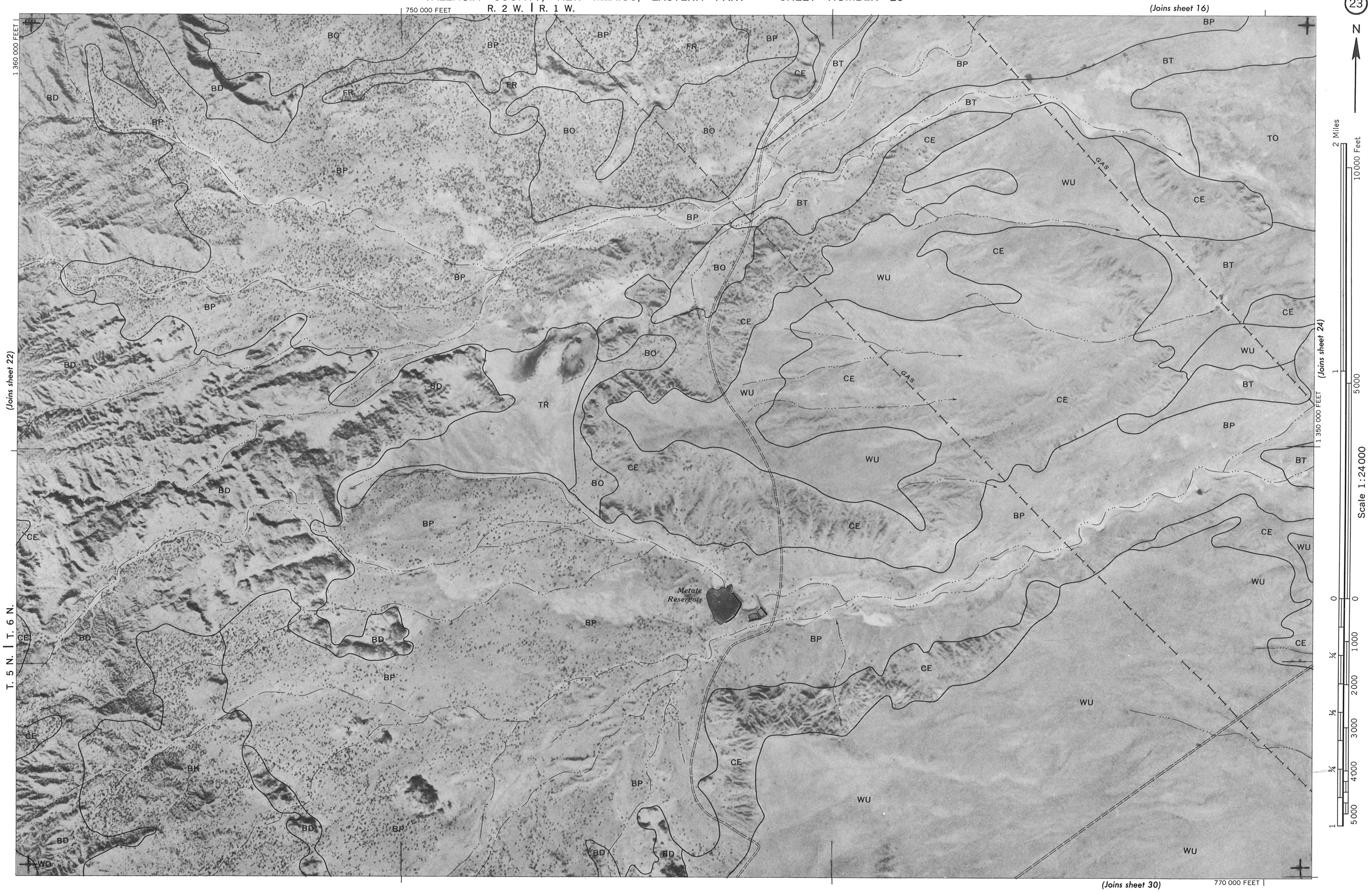
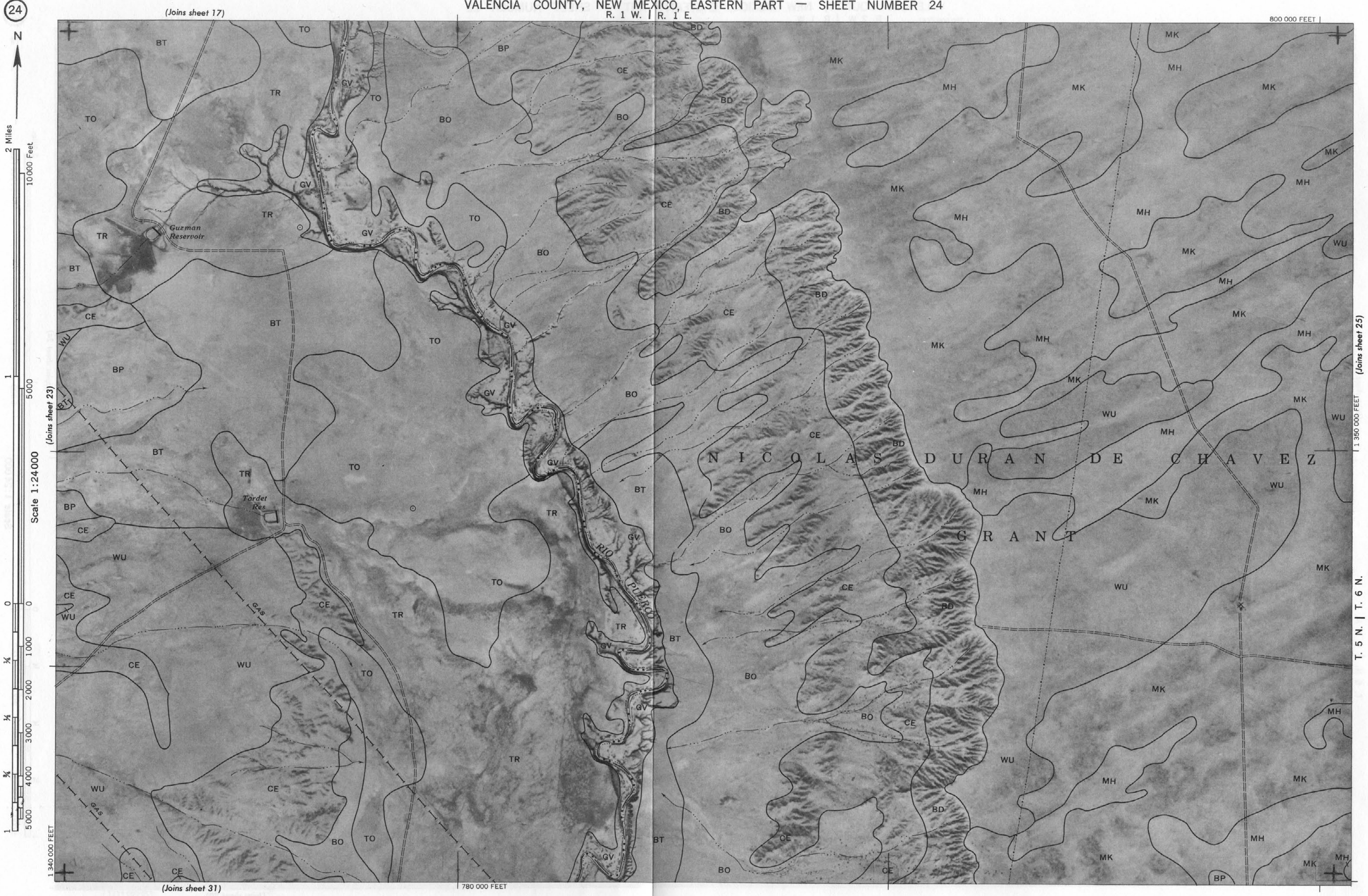
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 24



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 25

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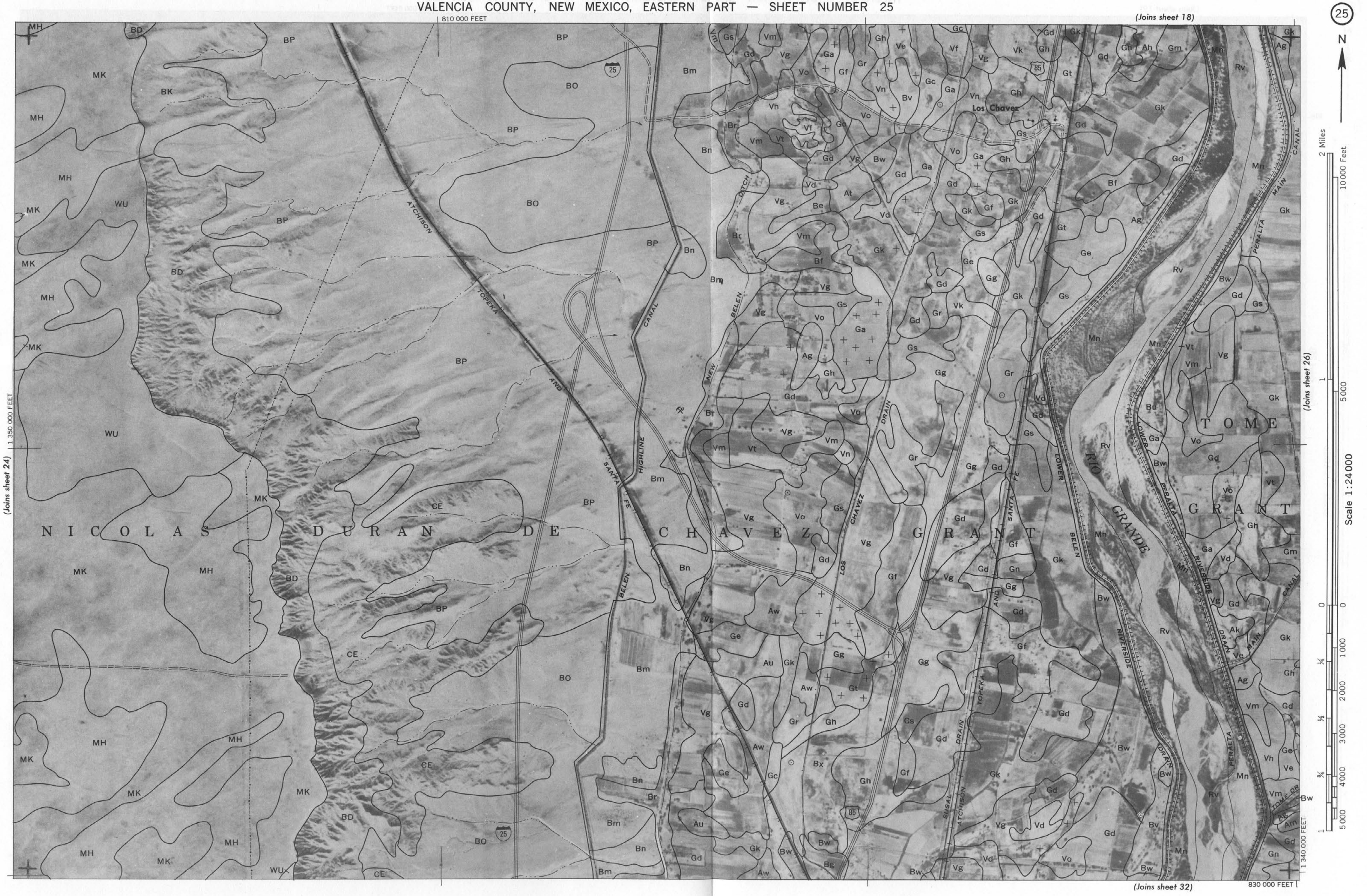
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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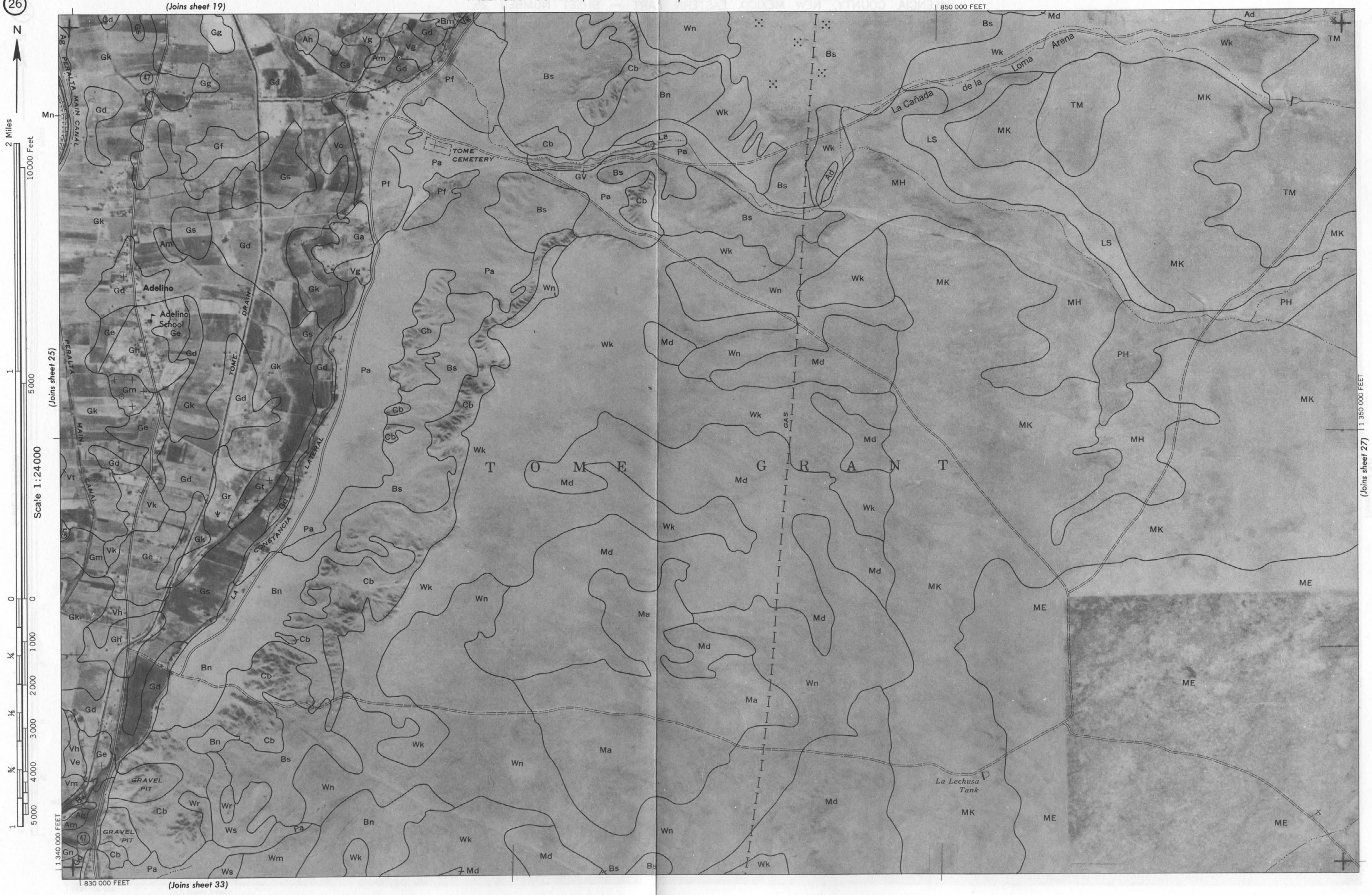
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 26



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 27

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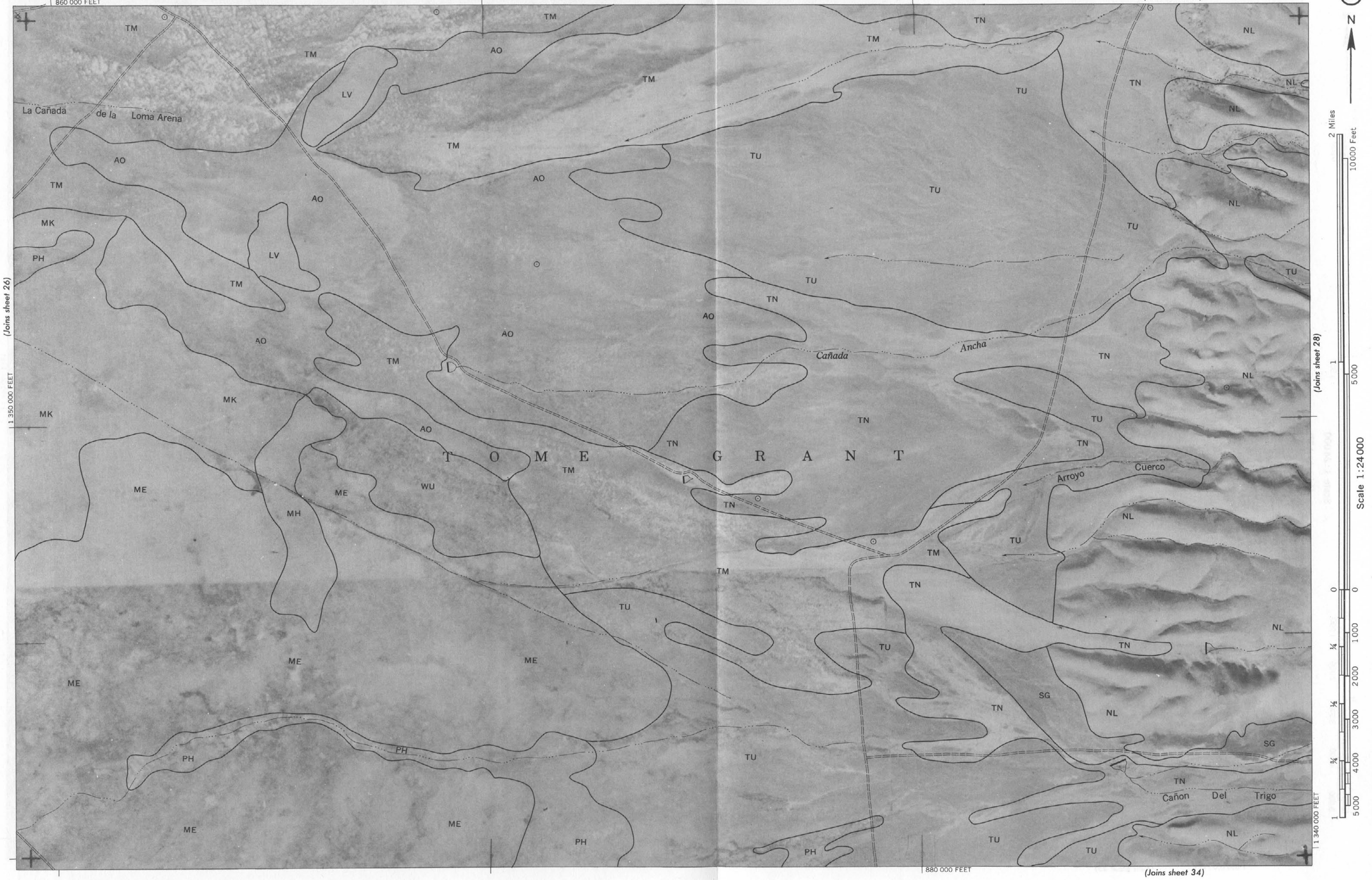
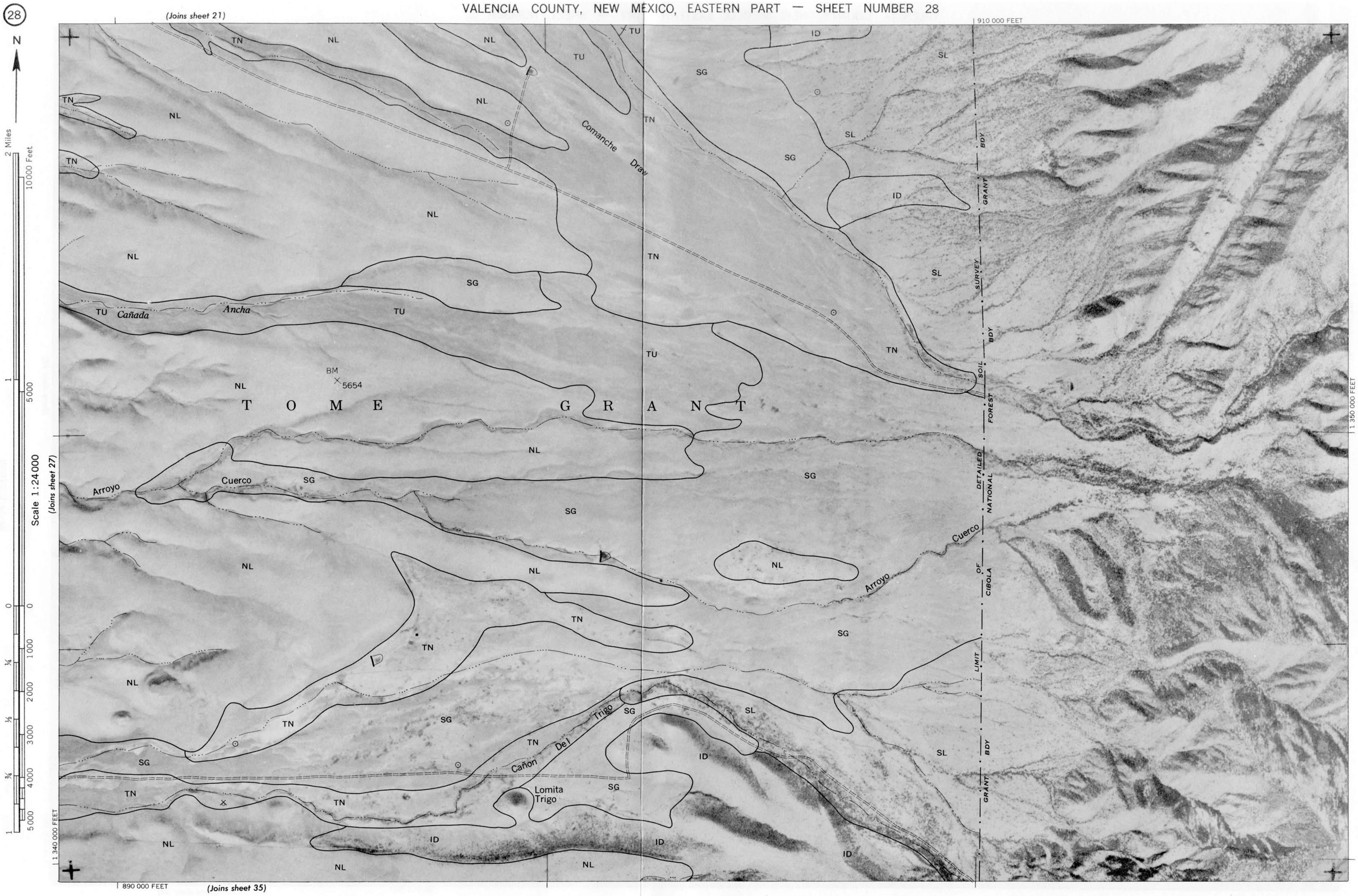
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 28



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 29

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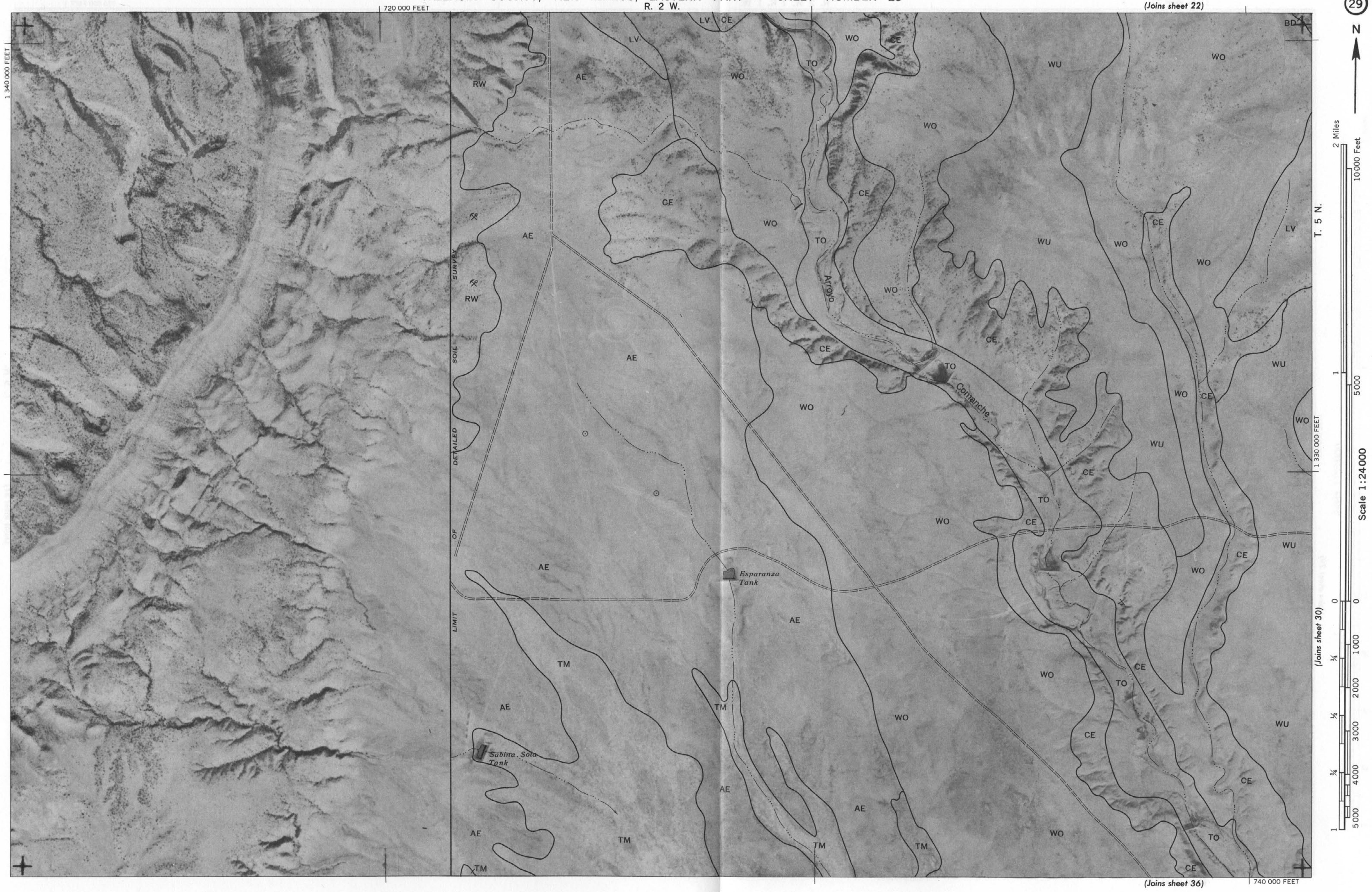
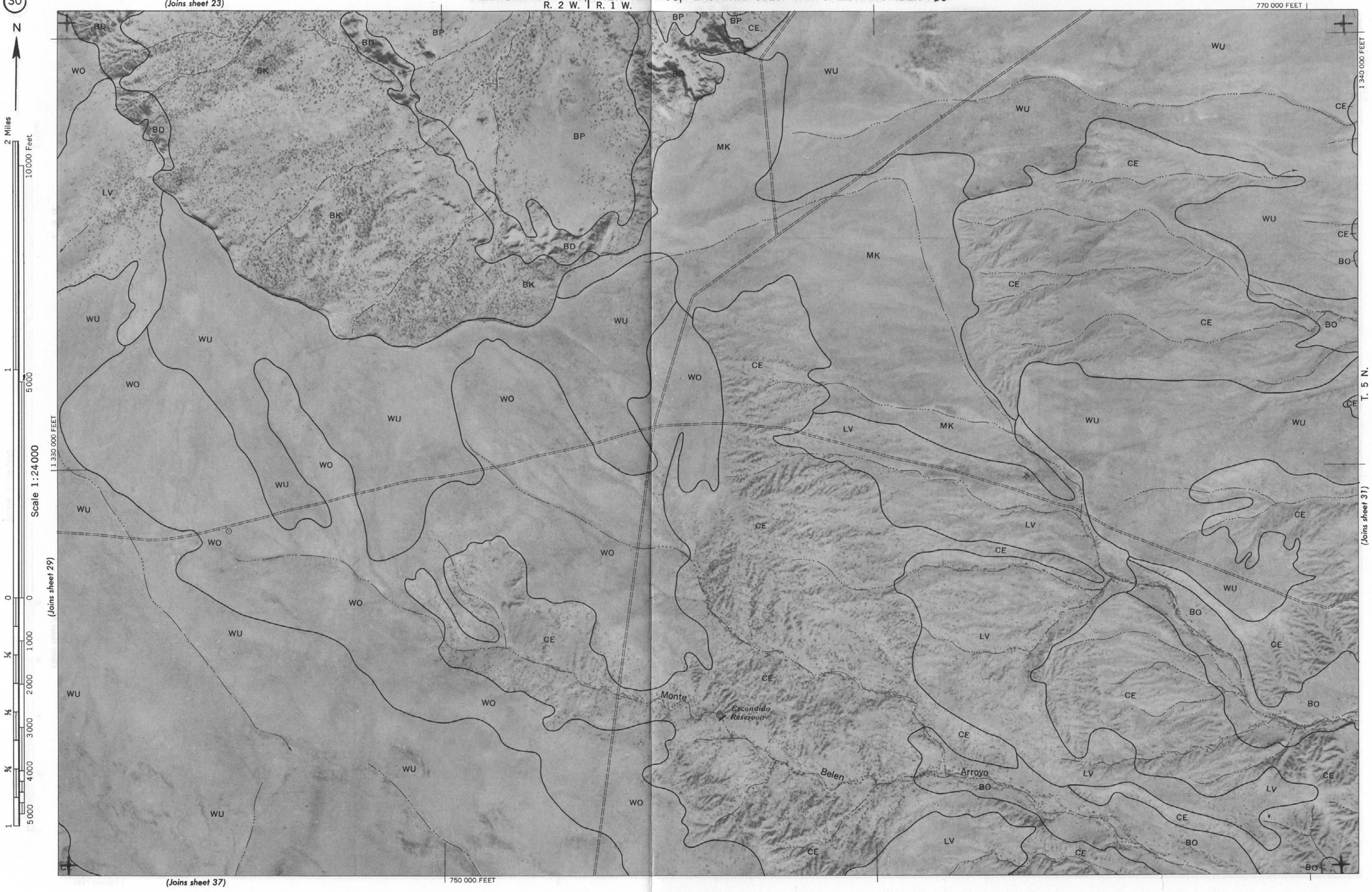
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 30



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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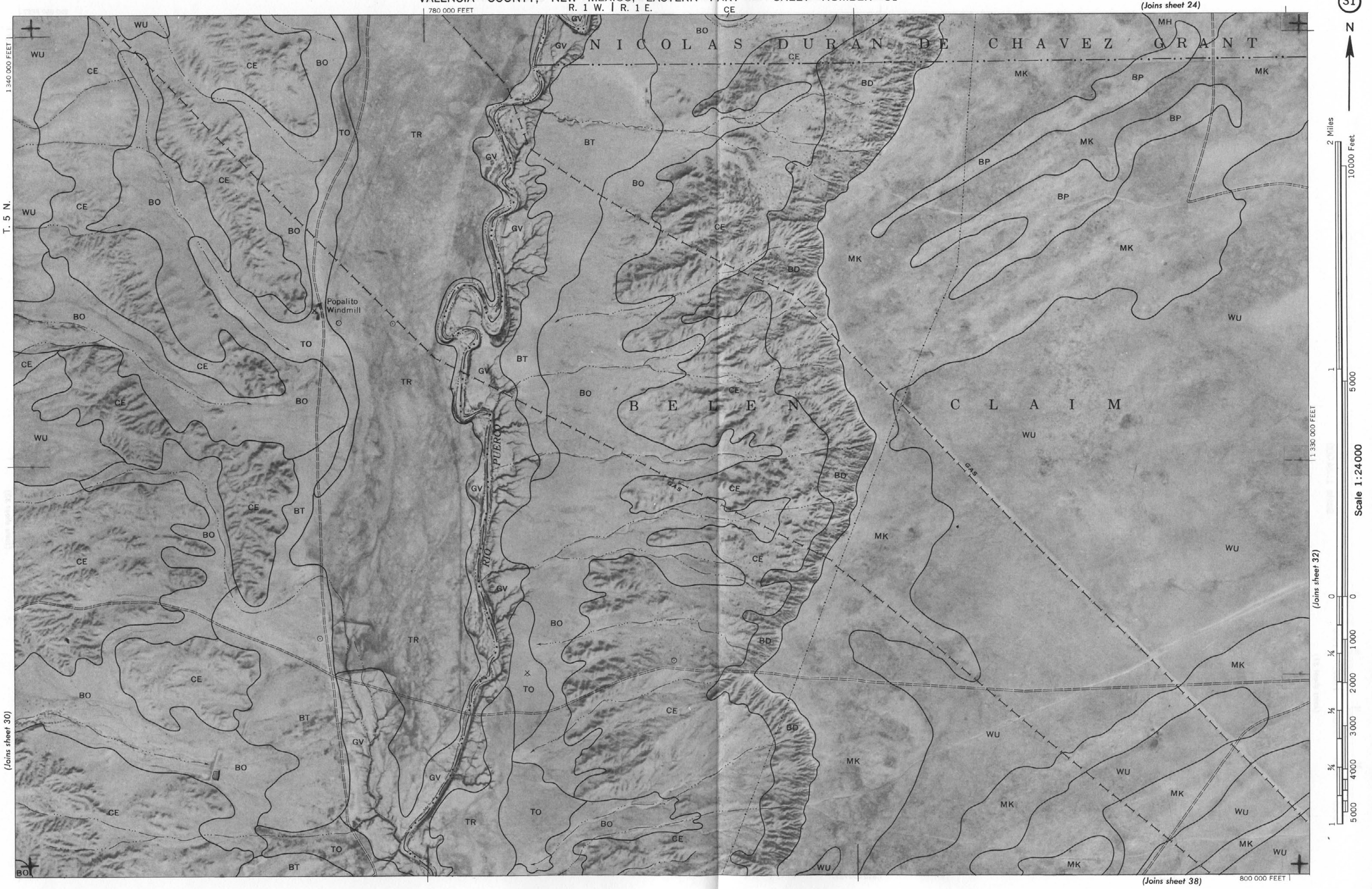
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 31



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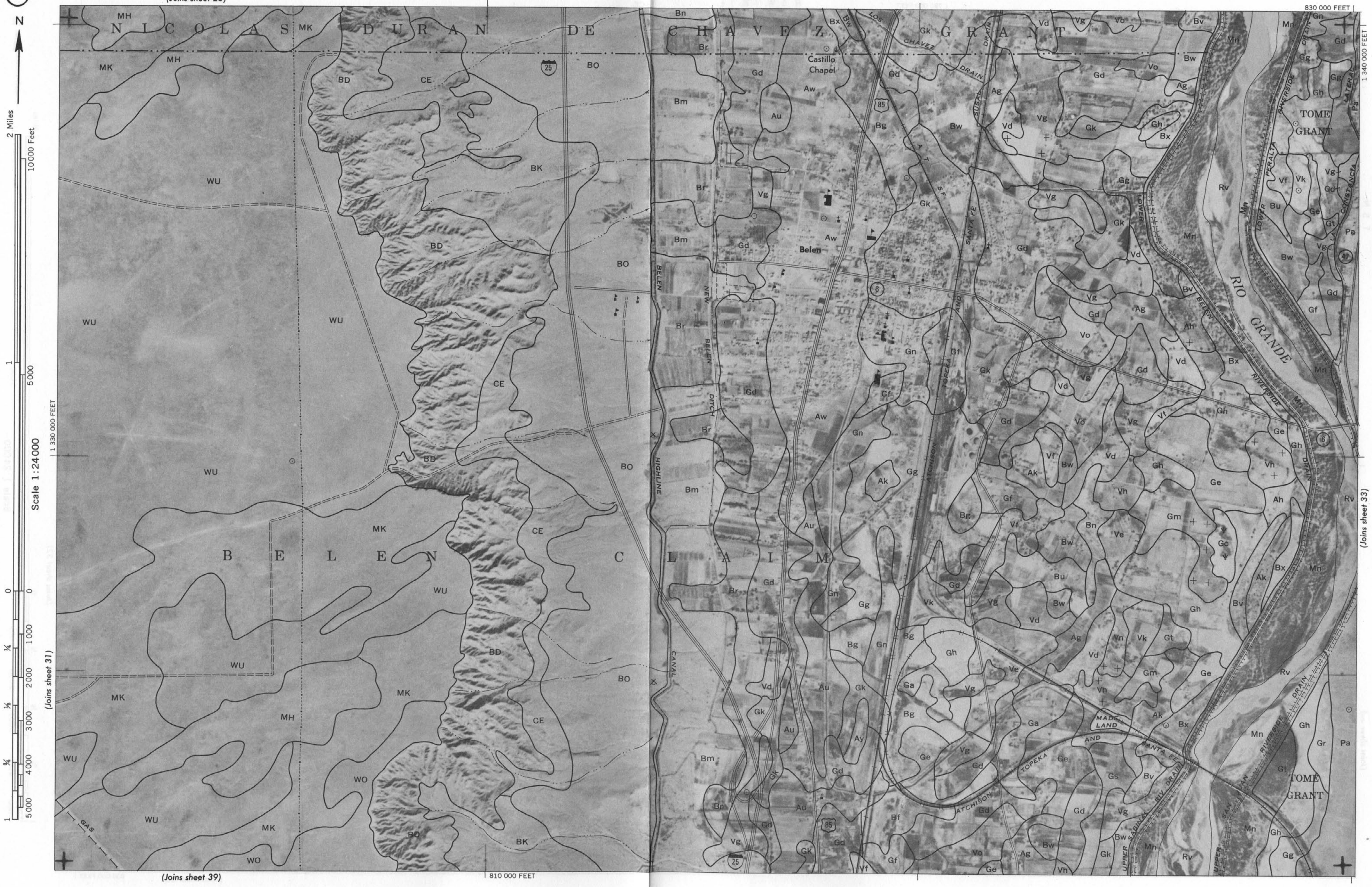
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 32



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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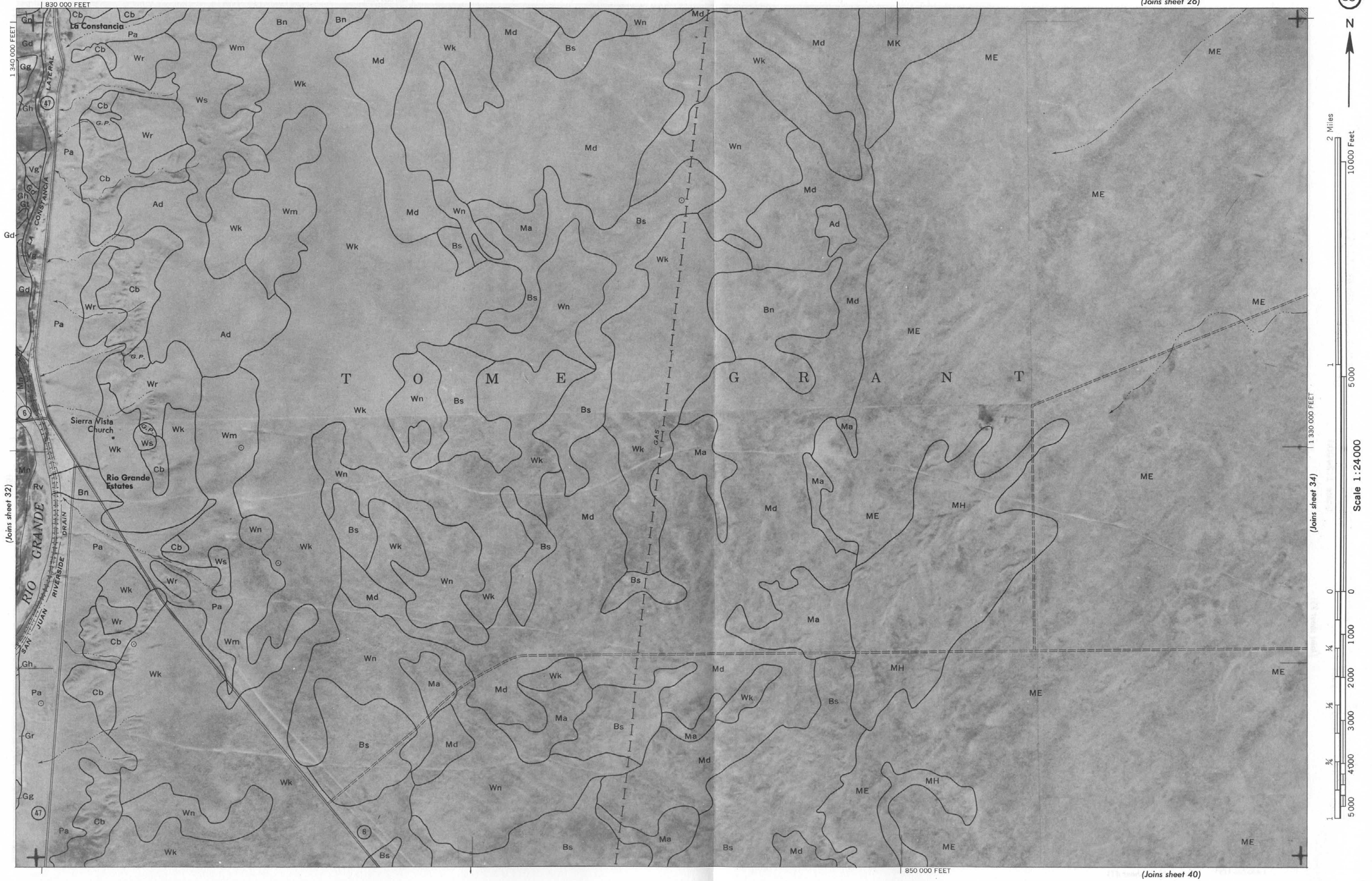
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 33



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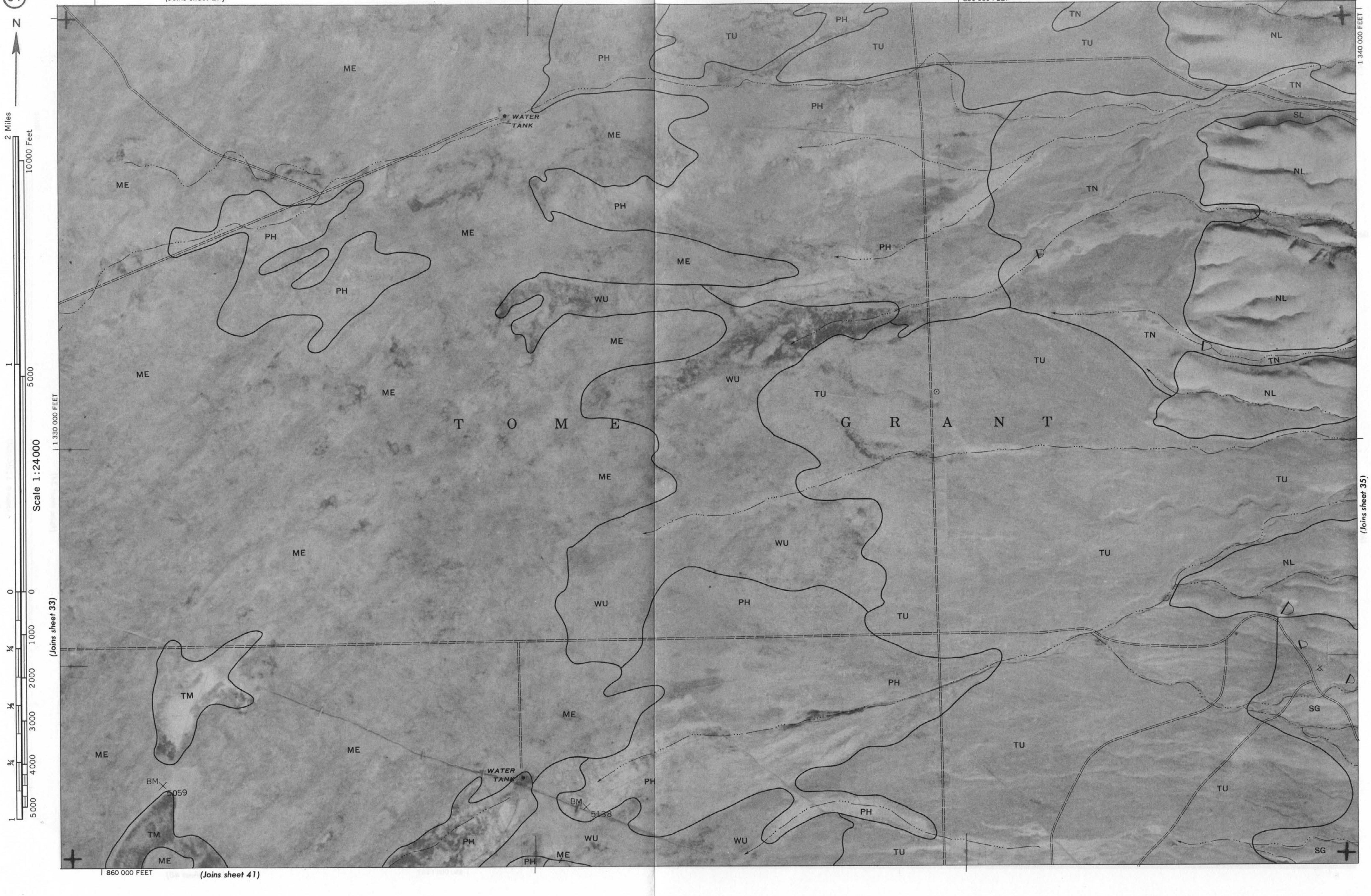
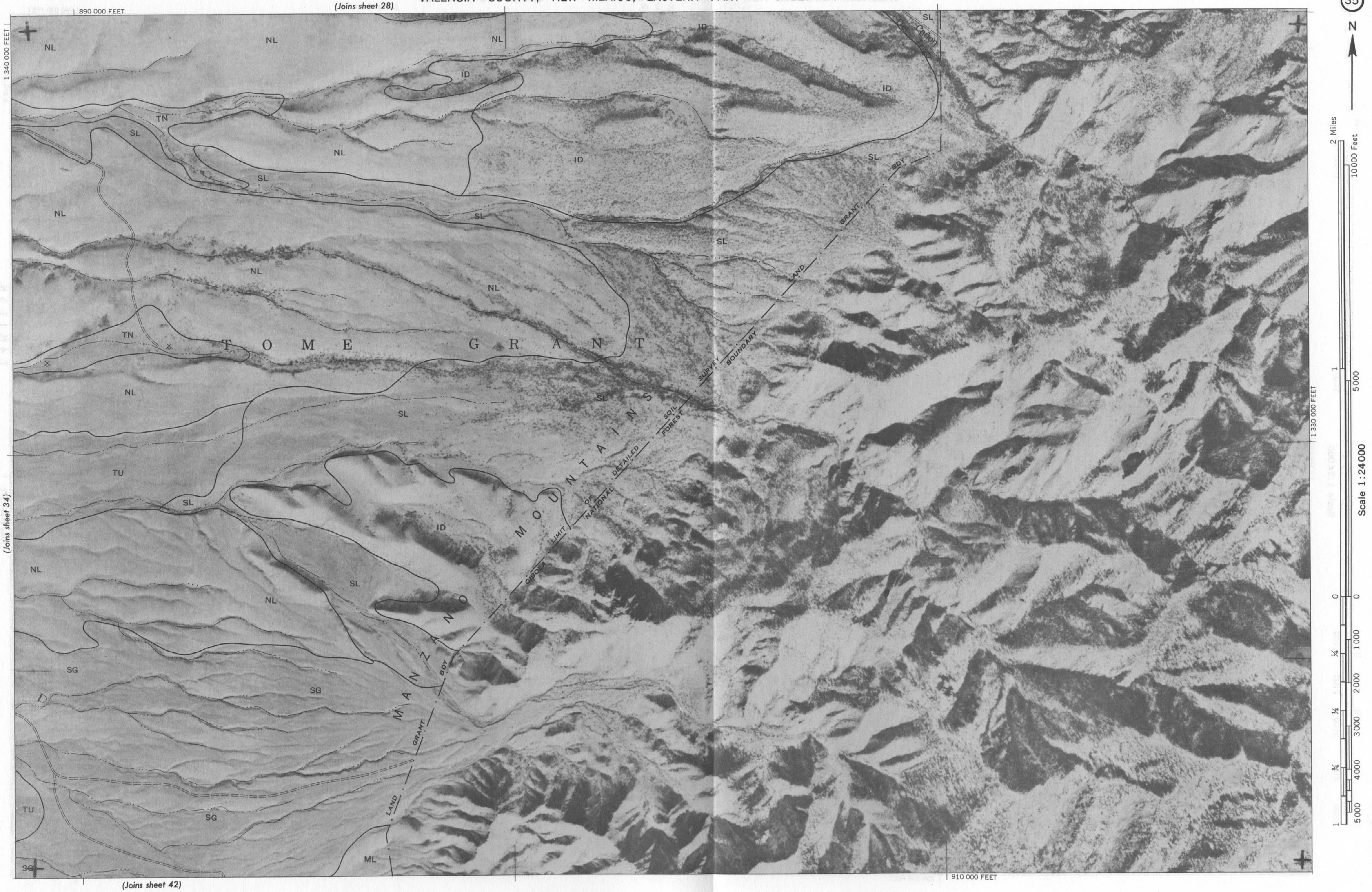
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 34



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

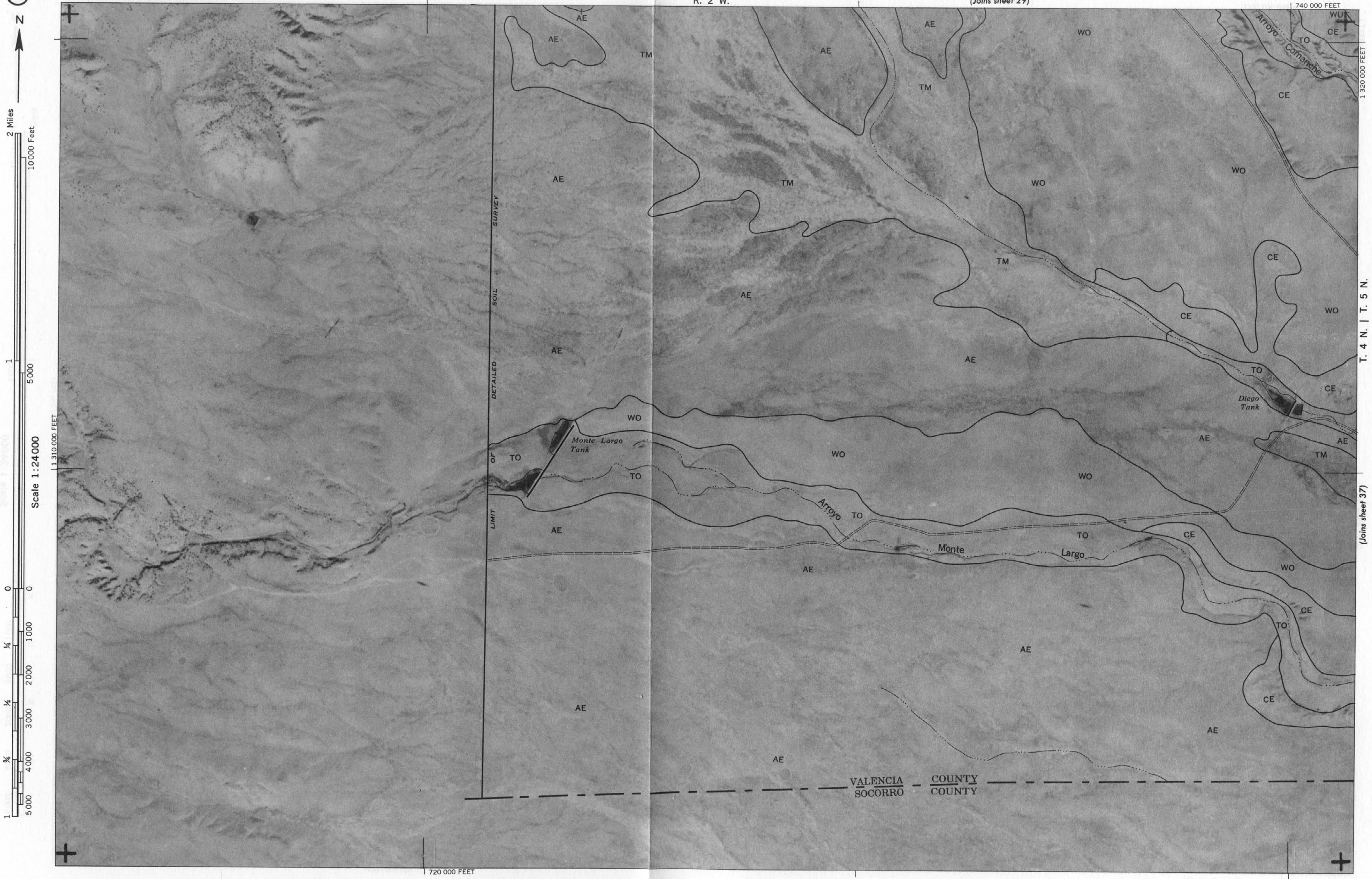
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 35



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 36



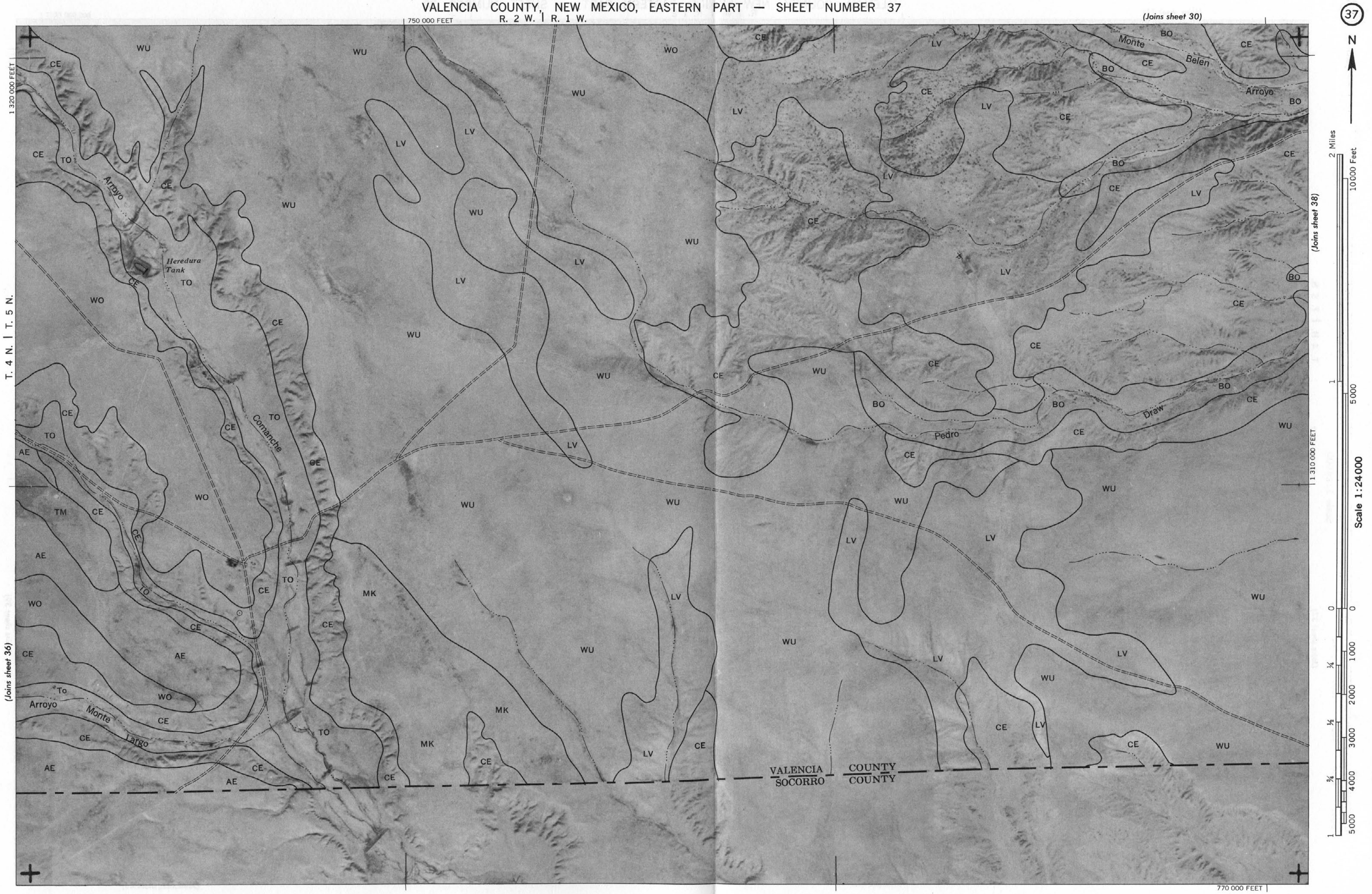
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 37

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



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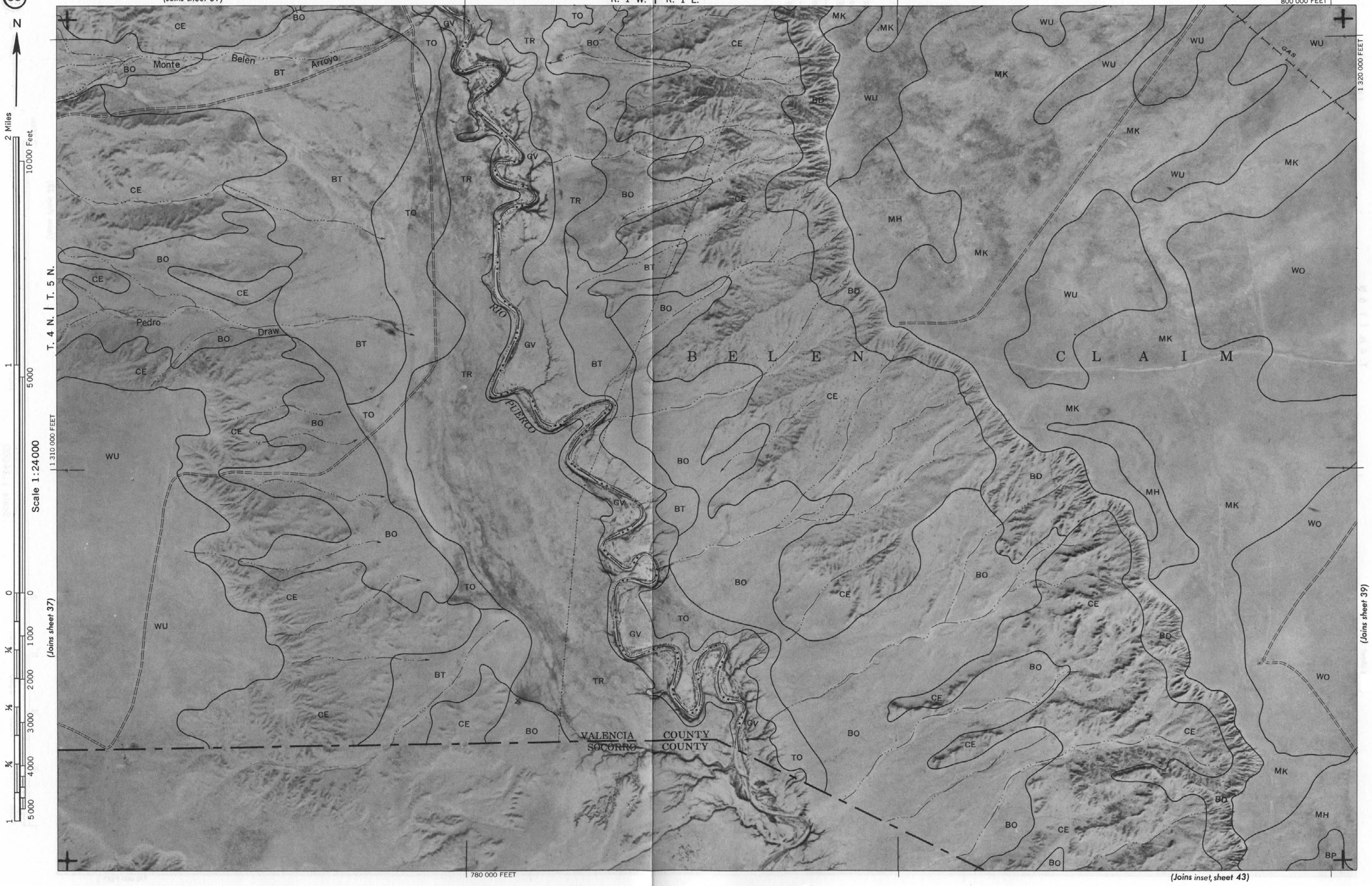
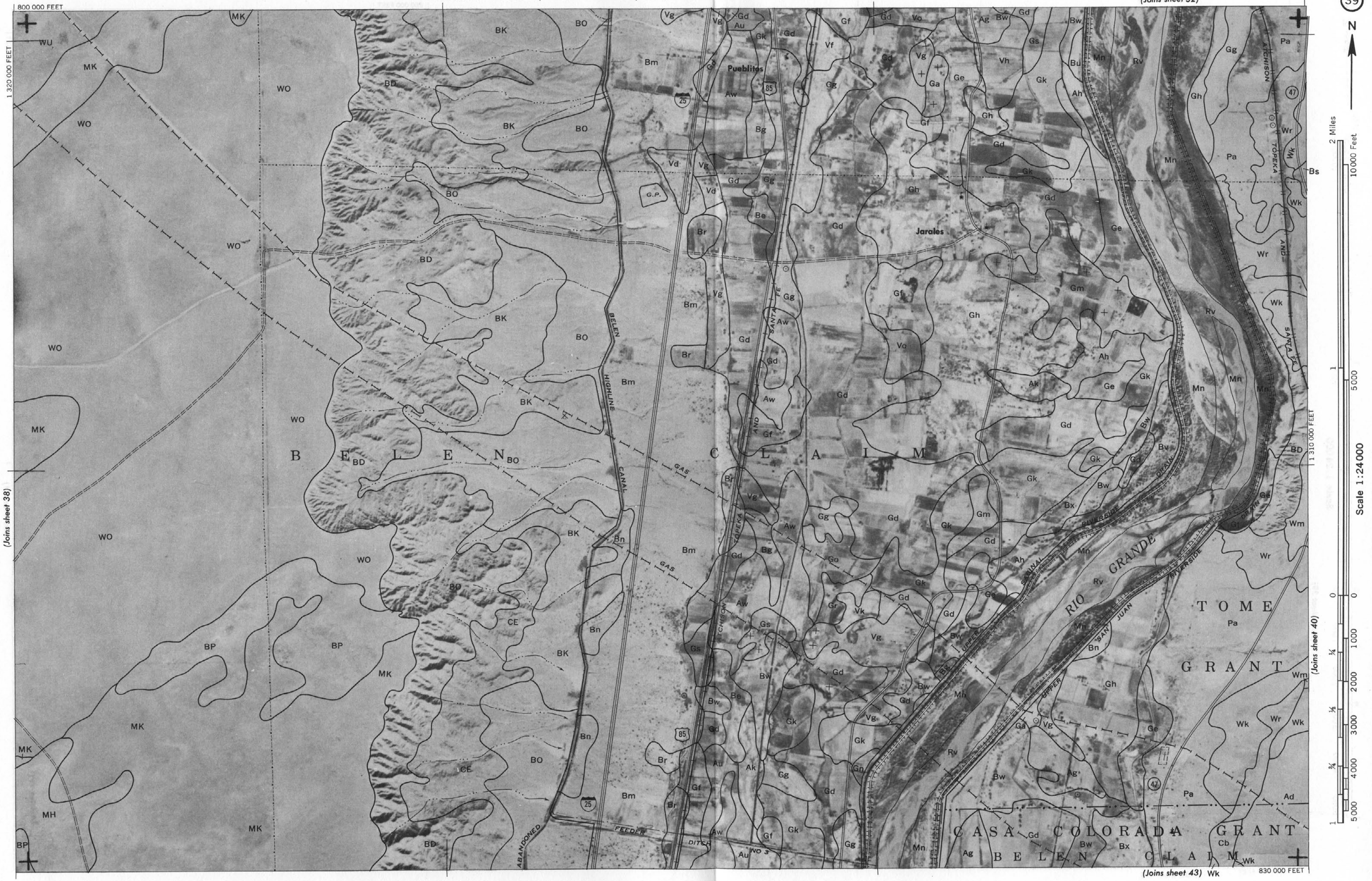
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 38



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

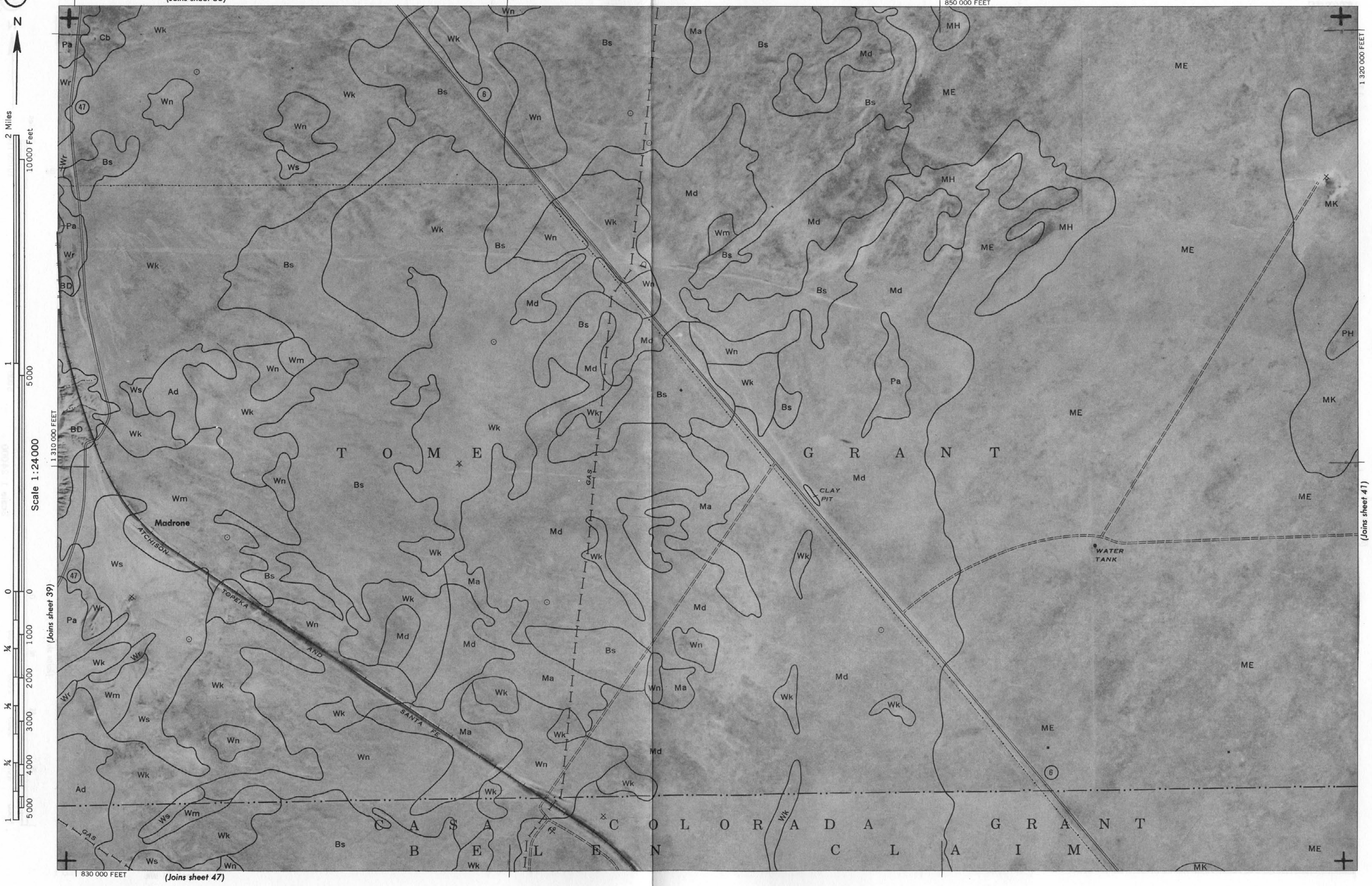
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 39



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 40

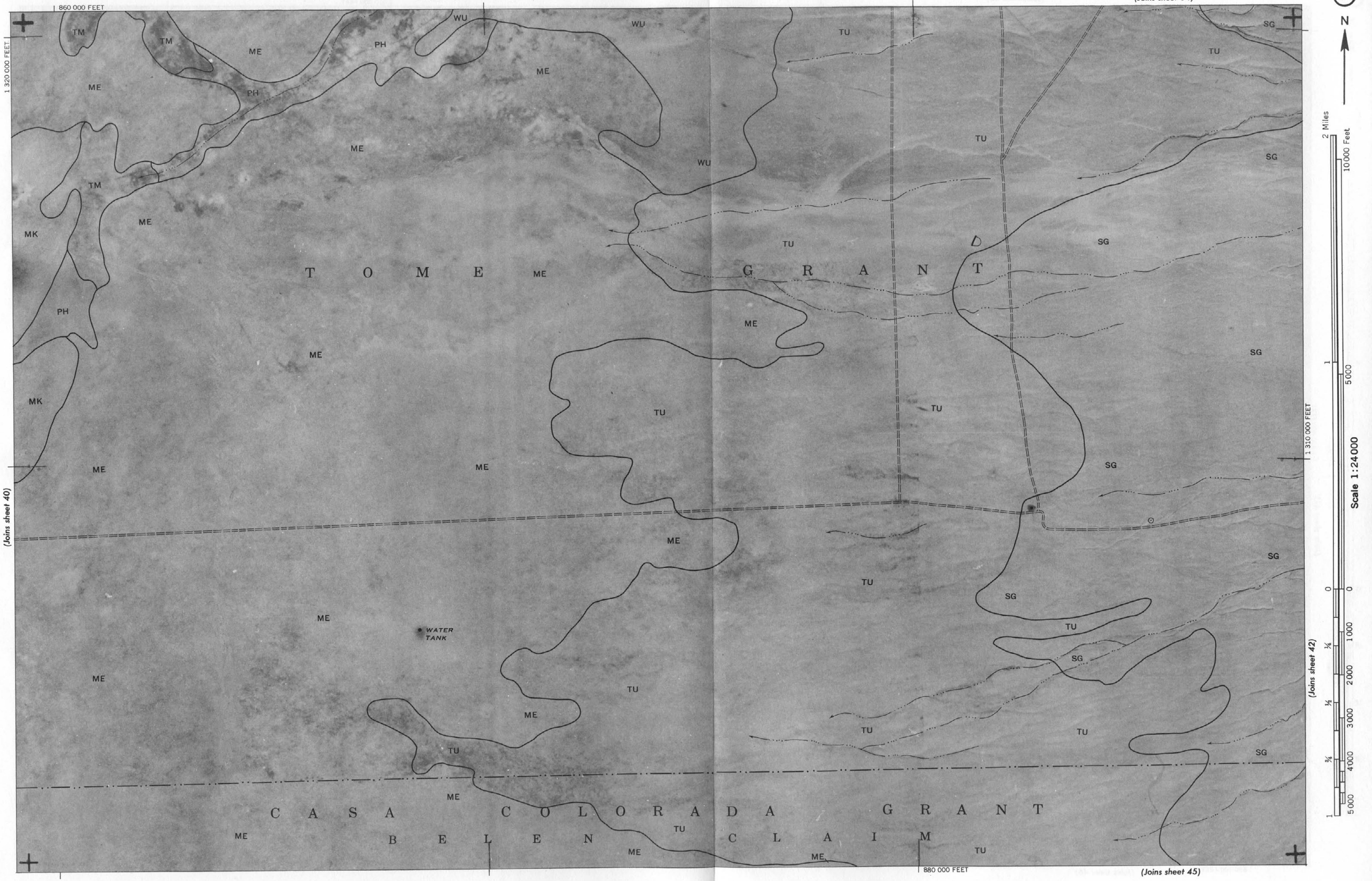


Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

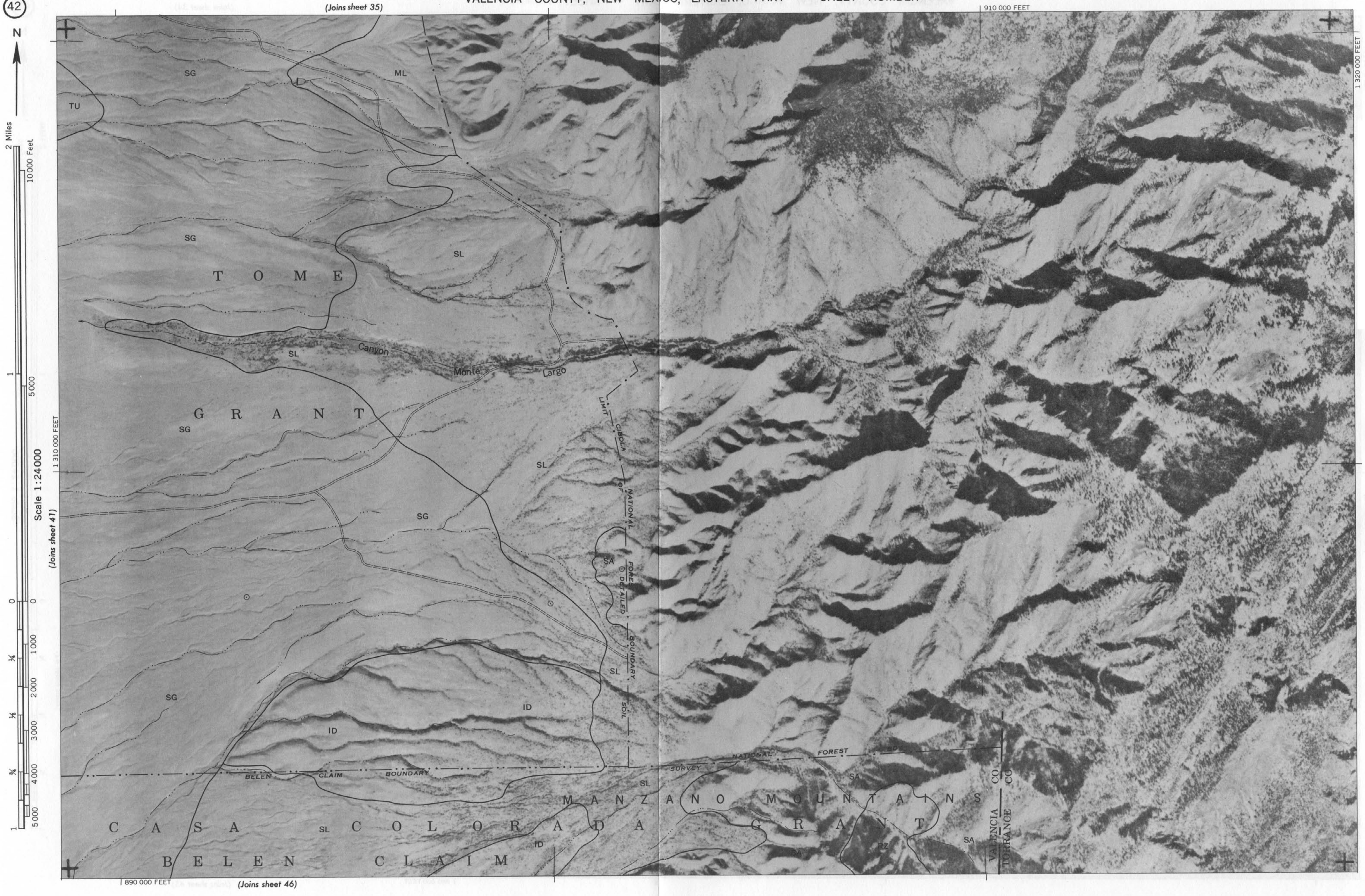
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 41

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



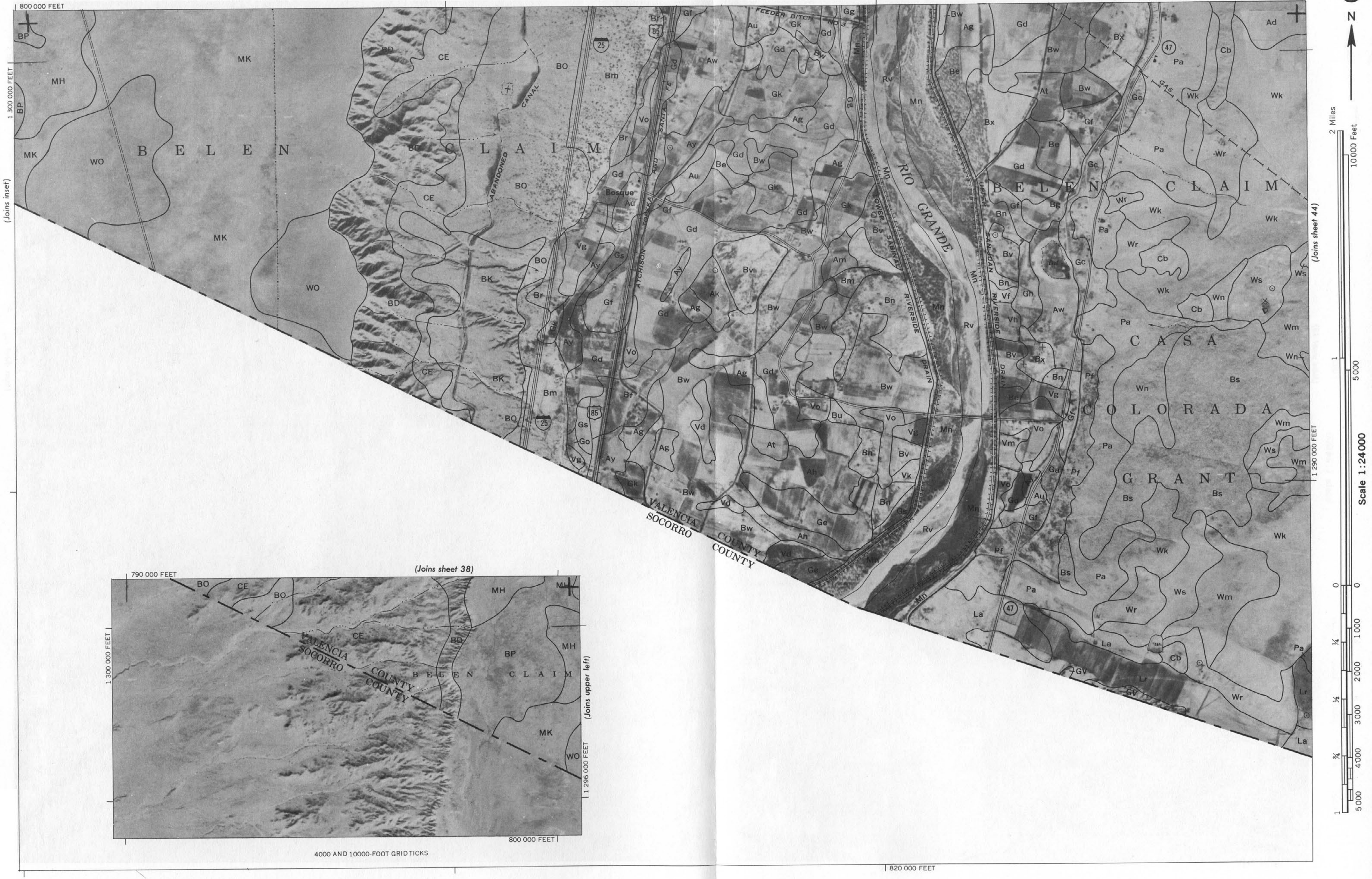
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 42



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior,

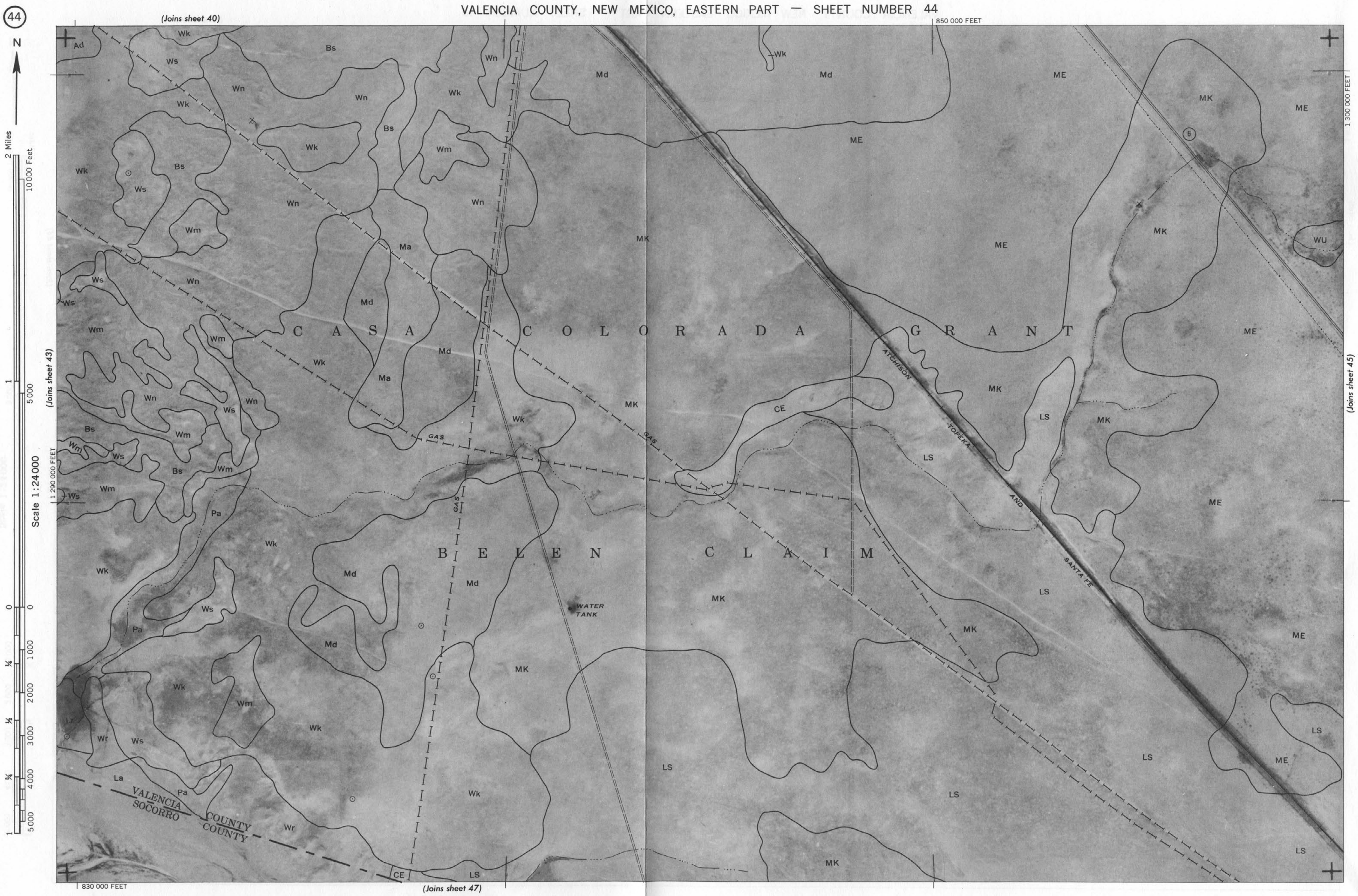
VALENCIA COUNTY, NEW MEXICO EASTERN PART — SHEET NUMBER 43



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 44

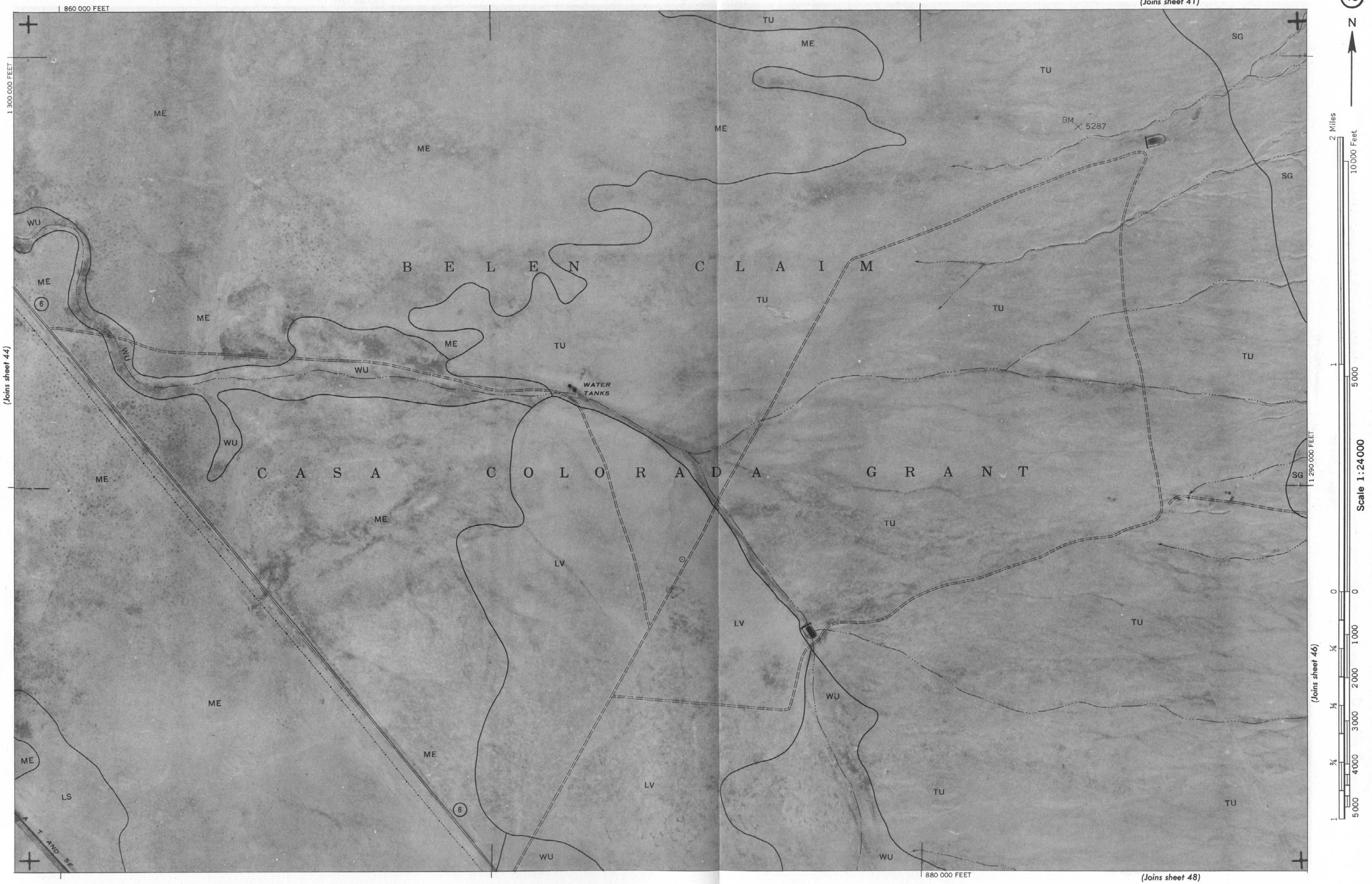


Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

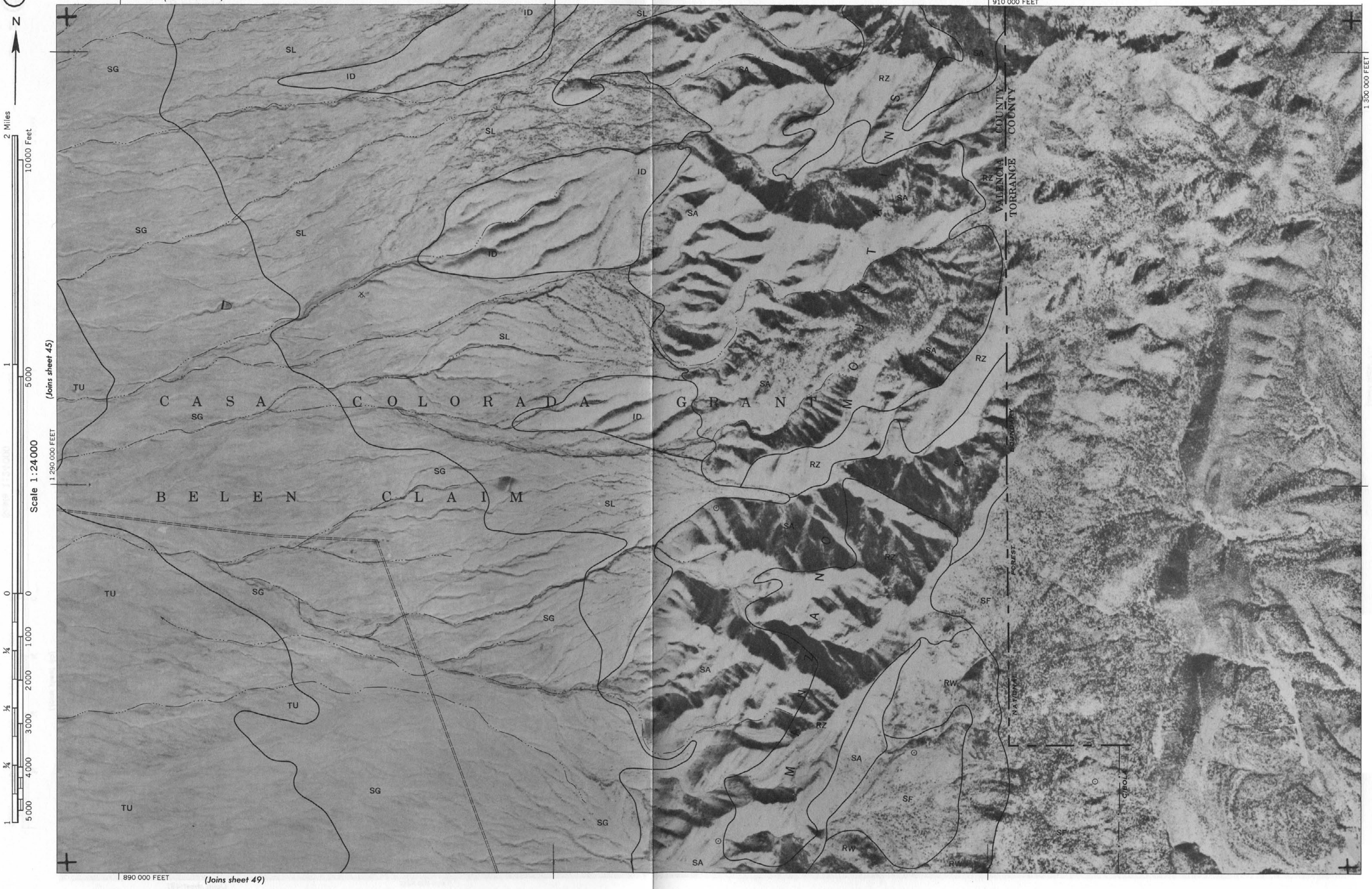
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 45

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.



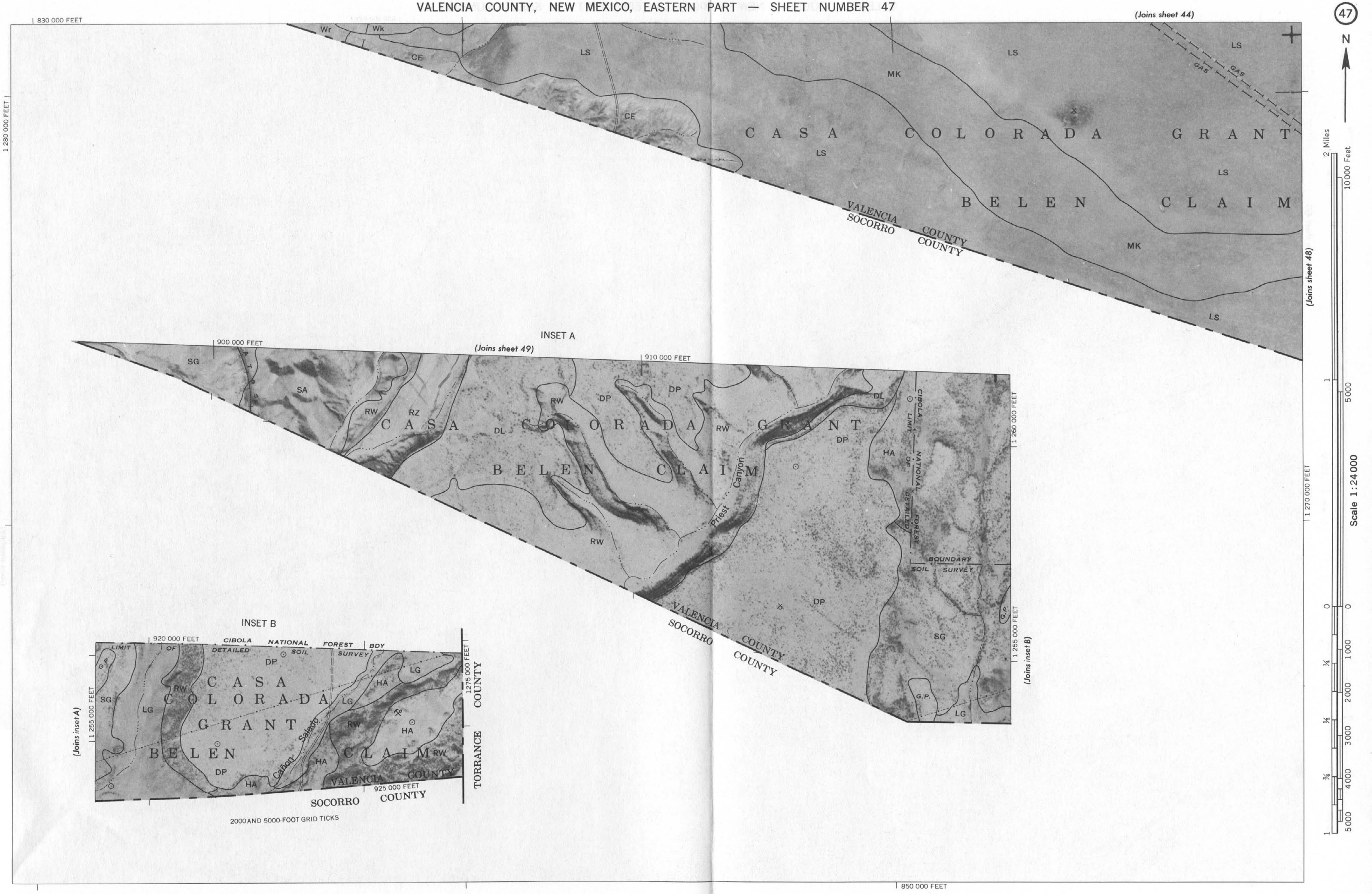
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 46



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 47



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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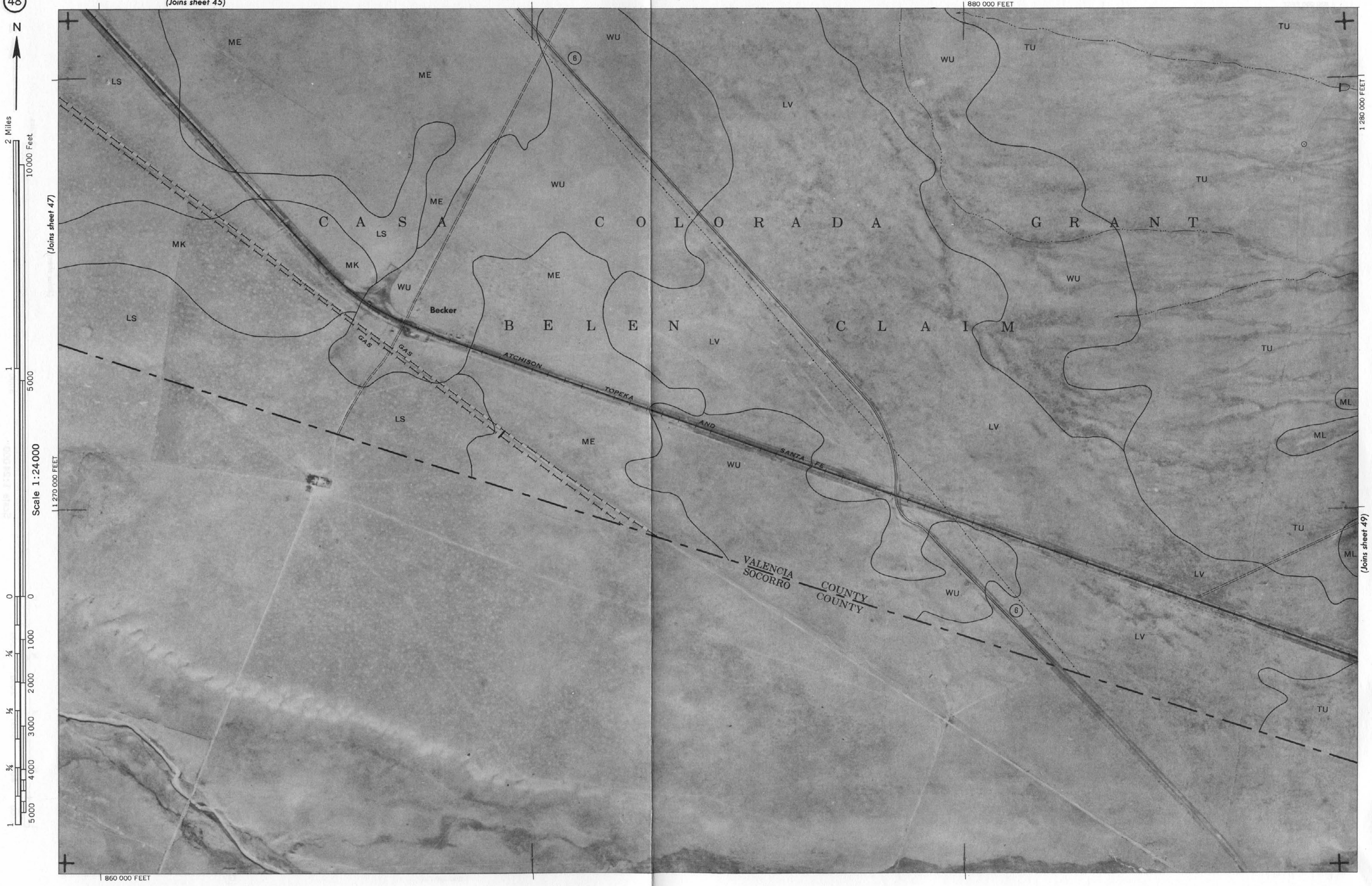
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 48



Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.

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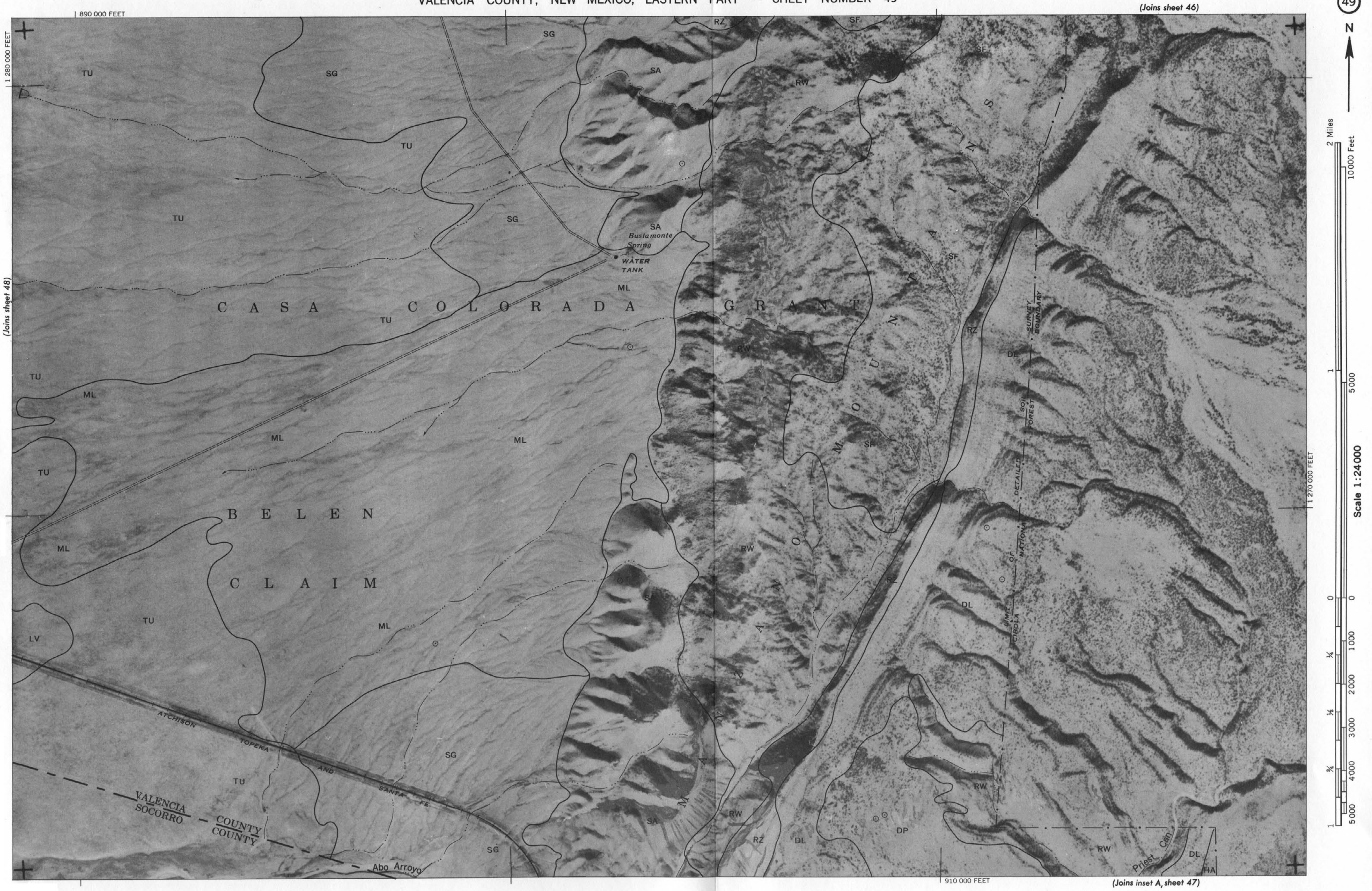
VALENCIA COUNTY, NEW MEXICO, EASTERN PART — SHEET NUMBER 49



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, United States Department of the Interior, Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.
Photobase from 1954 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the New Mexico coordinate system, north zone.